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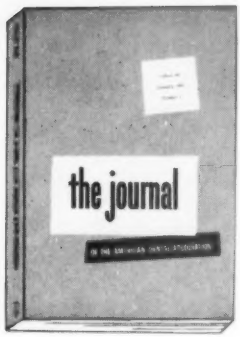

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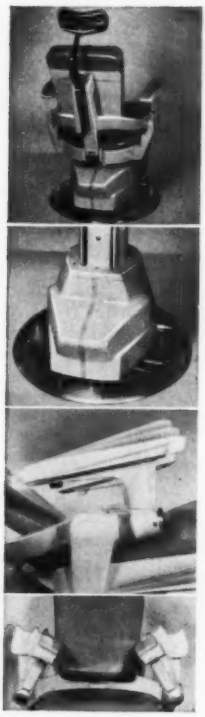

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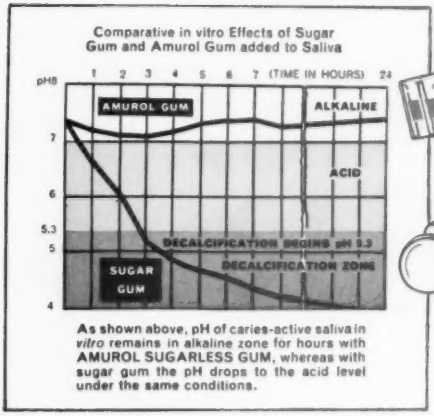

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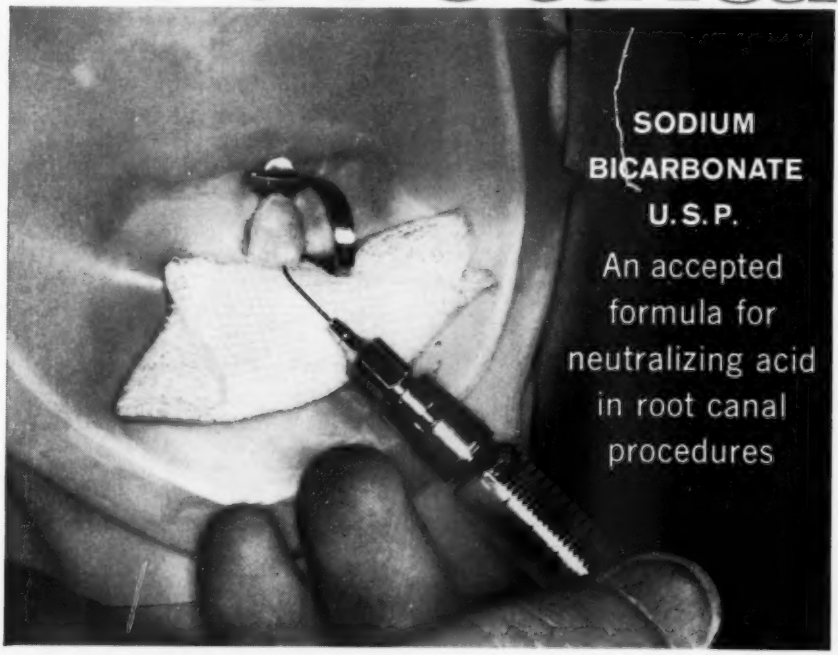

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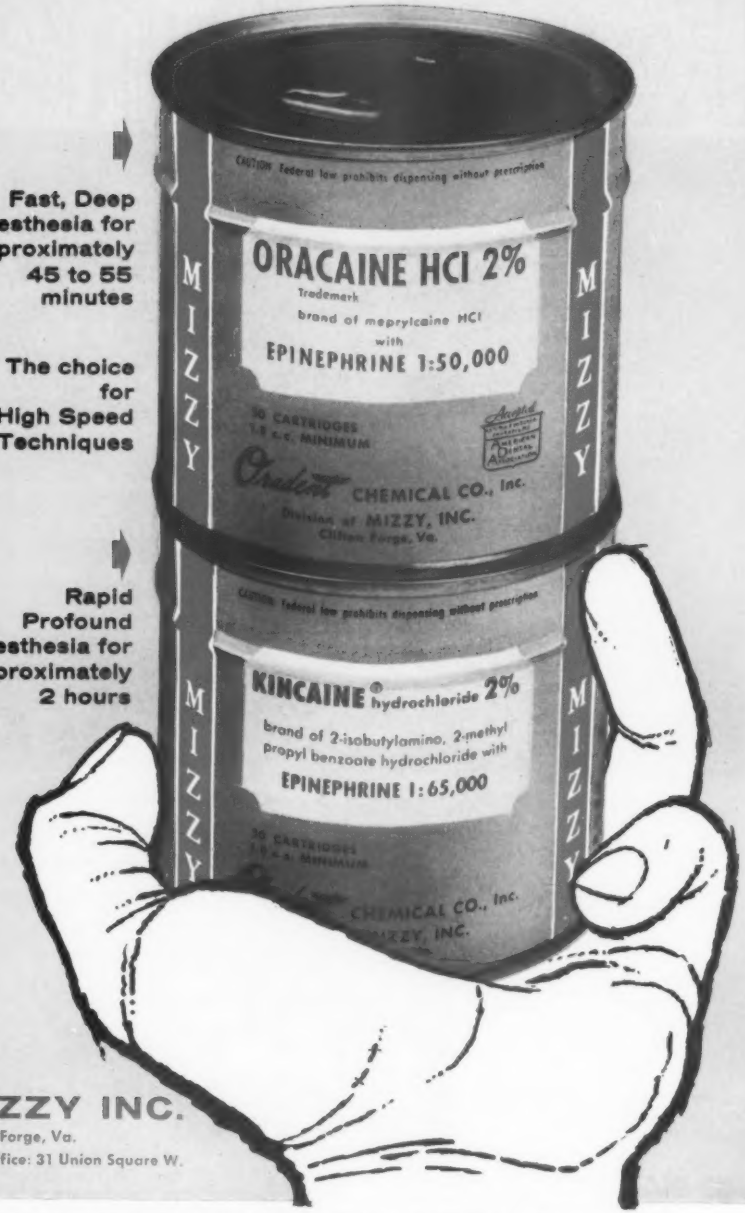

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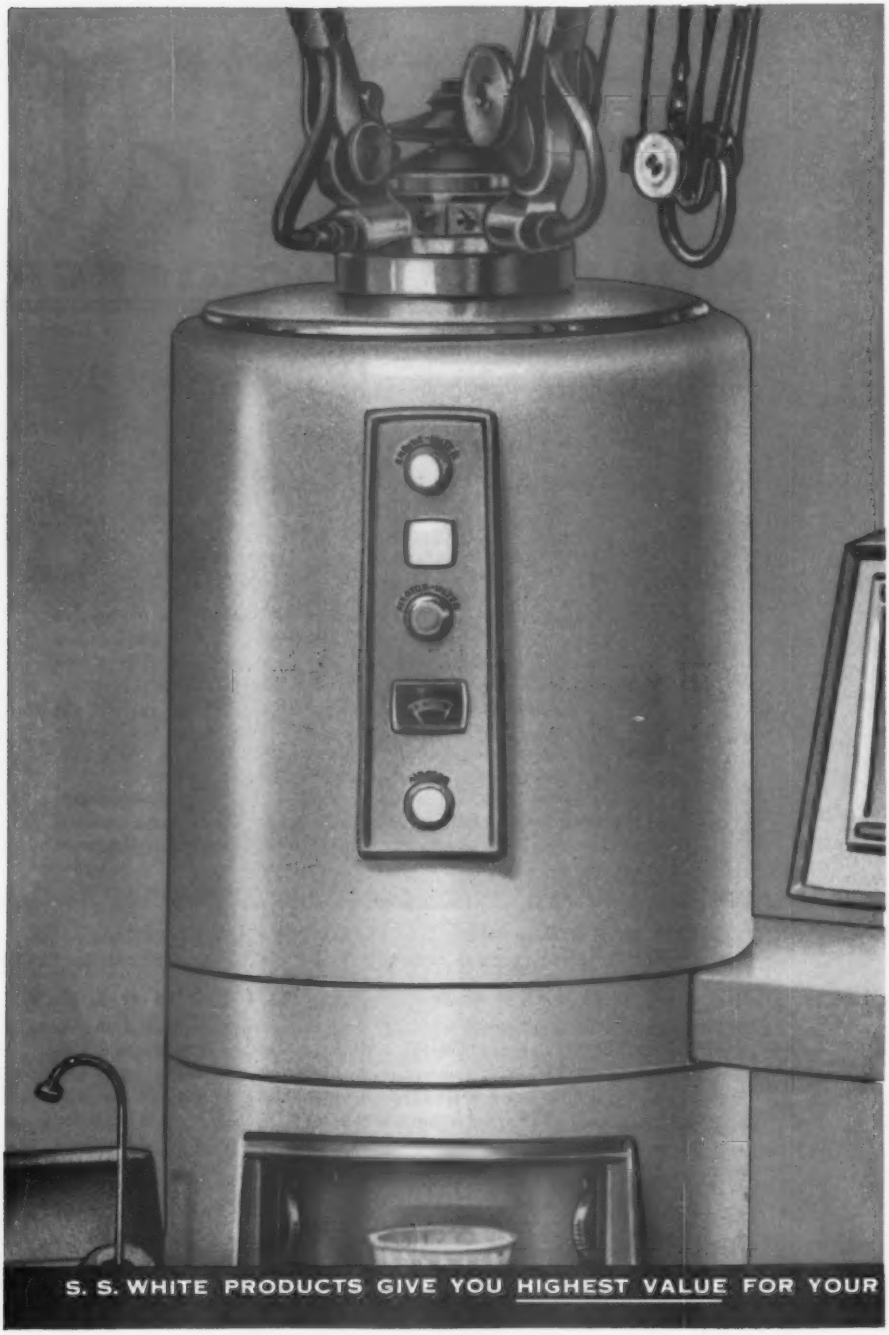
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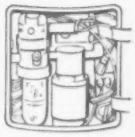

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Dimensional changes occurring in dentures during processing

Julian B. Woelfel, D.D.S.; George C. Paffenbarger,† D.D.S., and William T. Sweeney,‡ A.B., Washington, D. C.*

The relative accuracy of the fit of 186 complete dentures (73 clinical and 113 technic) made of 12 materials with recommended processing technics was determined. The greatest linear changes in dimension across the posterior section of the dentures occurred when the cured denture was removed from the gypsum cast. Upper dentures changed less than lowers; thick upper and lower dentures changed less than thin ones. The differences among the molar-to-molar changes on the different materials are not clinically significant. The self-curing poly (methyl methacrylate), the epoxy resin, and hard rubber had low curing shrinkages. All of the dentures showed a distortion. Conventional acrylic resins processed with the usual dental technic of compression molding are just as stable in dimension as the special resins and technics investigated.

In recent years many attempts have been made to improve the accuracy of the fit of resin dentures by special methods of processing, by specially compounded resins, or by a combination of both. Vinyl-acrylic copolymers, polystyrene, and epoxy resins with special processing technics have been advocated in place of poly(methyl methacrylate). Some processing methods are claimed to produce absolutely accurate, strain-free dentures with excellent stability of form.

Many dentists believe that dentures with an acrylic resin base warp severely on processing and in service and that this supposed warpage causes inaccurate apposition of the denture to the tissues. The primary purpose of this study was to measure and to compare the relative accuracy of the fit of 186 dentures (73 clinical and 113 technic) made of the various resins (Table 1) using the different recommended processing technics. The measurement of dimensional

Table 1 • Denture base materials and processing technics investigated

Brand	Type of material	Date rec'd	Batch no.	Manufacturer or distributor	Processing method	Authors' comments on equipment and procedures
Acralite 88	Copolymer methacrylate, powder-liquid, cross-linked, self-curing	8-1-57	190	Acralite Co., Inc. New York	Compression molding (room temperature)	Conventional flasks are used. Special tinfoil substitute is recommended. Care and speed are essential during trial closures before resin hardens.
Duraflow	Acrylic resins, powder-liquid, cross-linked	9-16-57	0657E	Product Research Laboratory, Inc. Cambridge, Mass.	Compression molding (no trial packing)	Conventional flasks are used. There is no trial closure. Technic is exceptionally simple.
Epoxolon	Epoxy resin, slurry-liquid	11-8-57	Lot #78	Surgident, Ltd., Los Angeles	Pouring (dry-low heat cure)	Specially prepared flasks and sprueing procedure are needed. Mold must be thoroughly dried in oven after wax removal. Denture resin is poured into preheated mold. Care must be taken to avoid trapped air. Investment is very strong, which makes deflasking difficult.
Hydro-Cast	Copolymer of acrylic resins, powder-liquid	12-17-57	no batch no.	Kay-See Dental Mfg. Co., Kansas City, Mo.	Directional hydraulic compression (Hydro-Cast technic)	Special equipment is needed. There is no trial closure. It is sometimes difficult to maintain water pressure during curing. Frequently molar teeth are depressed by hydraulic pressure during processing. In 3 hours denture can be produced from the wax model.
Hygienic Dental Rubber	Dental rubber (pure para No. 37—dark olive)	6-15-58 Processed in commercial laboratory	06816	Hygienic Dental Manufacturing Co. Akron, Ohio	Vulcanization	Conventional flasks and vulcanizer are needed.
Jectron	Polystyrene, precured bar	11-1-57	75	Jectron Co., Toledo, Ohio	"Transinjection molding"	Special equipment is needed. Special investment and sprueing are required. A precise, unalterable time schedule during preheating, injection and deflasking is mandatory. Investment is very hard, making deflasking difficult. In 3 hours a denture can be produced from the wax model.

Luxene 44	Vinyl-acrylic copolymer, gel	Processed by licensed commercial laboratory 1957 & 1958		Luxene, Inc. New York	Injection-moist heat ("Pressure Cast" process)	Special equipment is needed. Special sprueing technic, tinfoil substitute, investment and precise time schedule are necessary. Deflasking is difficult.
Miracle 50	Acrylic resin powder-liquid, cross-linked, containing 14% glass fibers by weight	10-8-57	no batch no.	American Consolidated Manufacturing Co. Philadelphia	Compression molding	Conventional flasks are used. Powder and monomer are kneaded together in polyethylene bag. Packing consistency is stiff. Glass fibers make it difficult to trim off excess during trial packing. Glass fibers do not bond well to resin, making it difficult to obtain highly polished smooth surface on the denture.
Mystic 100	Acrylic resin powder-liquid, cross-linked, containing 21% glass fibers by weight	10-8-57	no batch no.	American Consolidated Manufacturing Co. Philadelphia	Compression molding	
Tilon	Copolymers of methy and ethyl methacrylate, uncross-linked, gel	1-1-57	A6A6	Ticonium Div. of Consolidated Metal Products Corp., Albany, N. Y.	Injection-dry heat ("Unidirectional Curing")	Special equipment is needed. Special tinfoil substitutes are recommended. Precise schedule is required. Investment is hard and bulky making deflasking difficult.
Vernonite	Acrylic resin, powder-liquid, uncross-linked	7-1-57	492	Vernon-Benshoff Co. Pittsburgh, Pa.	Compression molding	Conventional flasks and technic are used.
Vacalon	Methyl methacrylate, powder-liquid (no catalyst in polymer or hydroquinone in monomer)	Resin furnished and processed by manufacturer July 1958 and August 1959		Harold C. Emrick Laboratory Ft. Wayne, Ind.	"Electro-vacuum process" (high temperature in vacuum)	Special equipment is needed. A specially prepared acrylic resin is recommended. There is no trial closure. (All dentures were processed in manufacturer's laboratory.)

changes occurring in both the clinical dentures and in the technic dentures (stored in water) is continuing. These results will be reported when the dentures are about two years old.

Dentists have been critical of available organic denture base materials since the turn of the century. Hard rubber, widely used for over 60 years, was criticized for its color, opacity, porosity, inability to hold a polish, and deterioration with age. It was also difficult to process and repair. Many organic denture base materials were tried as substitutes for hard rubber, chiefly in an effort to improve esthetics. None of these substitutes, such as cellulose compounds, phenol-formaldehyde resins, glyptal resins and vinyl copolymers, proved satisfactory. Acrylic resins, first introduced in the United States in 1937, soon displaced the other organic denture base materials then in use because of attractive appearance, ability to retain a high polish, and because the processing and repairing technics were simple. Since 1940, the acrylic resins have dominated the organic materials used for denture bases.

Linear curing shrinkage reported for hard rubber ranged from 0.3 per cent to 0.5 per cent depending on the type of rubber and the thickness of the flat rectangular specimens. The shrinkage of similar specimens of acrylic resin ranged from 0.4 to 0.6 per cent.[1] Other reports[2-6] give somewhat different values. The small differences among the reported values are caused by variation in the size, shape, and treatment of the specimens and the composition of the various resins employed. These differences are academic and are not large enough to detect clinically.

As pointed out by some investigators, the expansion of heat-curing acrylic resins caused by water sorption compensates in part for the curing shrinkage. When acrylic resin dentures are conditioned in air at 32 per cent relative humidity before immersion in water, the expansion due to water sorption may be as high as 1 per cent.[1]

Severe warpage of acrylic resin dentures on repeated recuring[7] may have led to the persistent belief that acrylic resin dentures warp in amounts that have great clinical significance. However, it has been shown[1,2,4,8] on several hundred clinical and technic dentures that the linear changes are usually far less than 1 per cent. Sixteen of these dentures were measured at intervals during as long a period as six years.[9] Across a 50 mm. molar-to-molar span, 1 per cent is only 0.5 mm. A change of 0.76 mm. across the posterior section of a phenol-formaldehyde resin denture has been reported[2] without loss of retention or complaint from the patient.

Rapid tissue changes of a much larger amount have been shown by comparison of the profiles of artificial stone casts.[10,11] Casts were poured in impressions (made of free flowing materials) of upper and lower edentulous arches: (1) after ill-fitting dentures were worn and (2) several days after the ill-fitting dentures were removed. The cast profiles show that the oral tissues can change rapidly and in some instances as much as 3 mm. Such changes are many times that reported for acrylic resin dentures.

MATERIALS AND METHODS

Materials and Processing Methods • The trade brand of material, its general type, and the processing method used with it are shown in Table 1. The different types of acrylic resins were: powder-liquid (both uncross-linked and cross-linked), powder-liquid containing glass fibers, powder-liquid without catalyst or hydroquinone, powder-liquid self-curing, and the gel form. In addition to the acrylic resins, a polystyrene, an epoxy resin, a vinyl-acrylic copolymer, and hard rubber were used. The major processing methods employed were: compression molding (with and without trial pack-

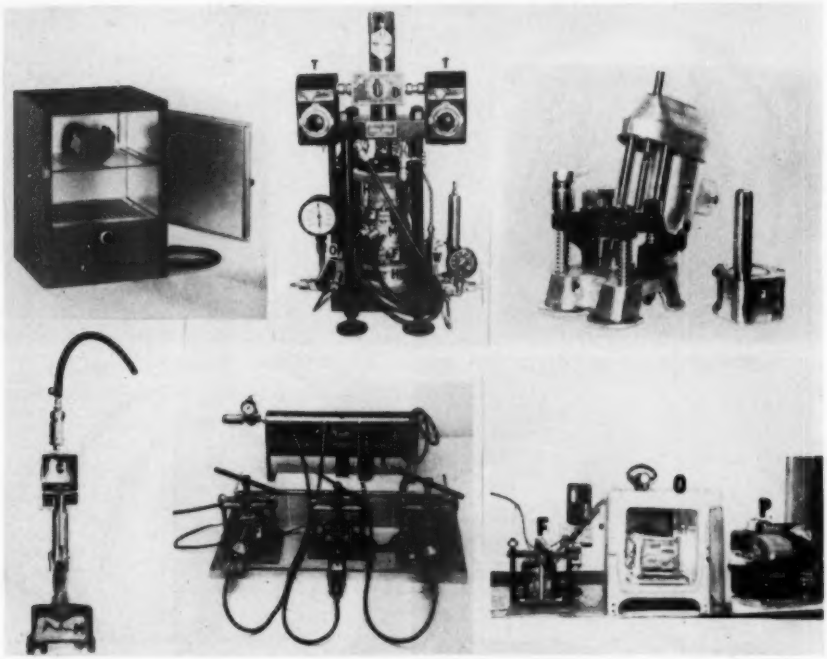

Fig. 1 • Above left: Flask and oven recommended for processing Epoxolon dentures

Above center: Equipment used in processing Hydro-Cast dentures. Adjustable thermostats (T) regulate temperature of heating elements (H). Hydraulic ram (R) for closing flasks (F) is controlled by oil pump and gauge assembly. Water under known pressure is supplied by water pump and gauge assembly (W) through large center hose to water manifold (M). Hydraulic force is applied through flasking gypsum of upper half of flasks and is directed only against tongue side of denture and a diaphragm of resin extending from border of the denture to the edge of the flasks (Fig. 2, above right). The two small side hoses entering the water manifold (M) are used to circulate cold water for rapidly cooling of the cured dentures. Timing device is shown at (D)

Above right: Injection apparatus and flask used in making Jectron dentures. Injection cylinder (I) contains preheated rod of Jectron. The flask assembly (F) is seated on platform (P) so that the screw ram (R) fits into end of injection cylinder (I). An electric motor (M) drives ram down, forcing the preheated Jectron into the mold in the preheated flask (F)

Below left: Cross-sectional view of equipment used in processing Luxene 44 dentures. Compressed air fed into cylinder (C) drives piston (P), which forces resin into mold (M)

Below center: Battery of three units used in processing Tilon dentures. Compressed air is fed into injector (I), forcing Tilon into the mold in the flask (F). Flask is heated by the platen (P)

Below right: Equipment for processing Vacalon dentures. Flasks in press assembly (F) and oven (O) with press asssembly in muffle. Reduced pressure is obtained in oven (O) with vacuum pump (P)

ing), directional hydraulic compression molding, injection molding with the flasks being heated in water or by platens, transinjection molding, high temperature-vacuum cure, filling the mold by pouring combined with a low temperature-dry heat cure, and vulcanization. The comments in the last column of Table 1 are based on the experiences of the authors. Comparisons are made with the conventional equipment and procedures needed to flask, process, and finish compression-molded acrylic resin dentures.

Figure 1, above left, shows the oven

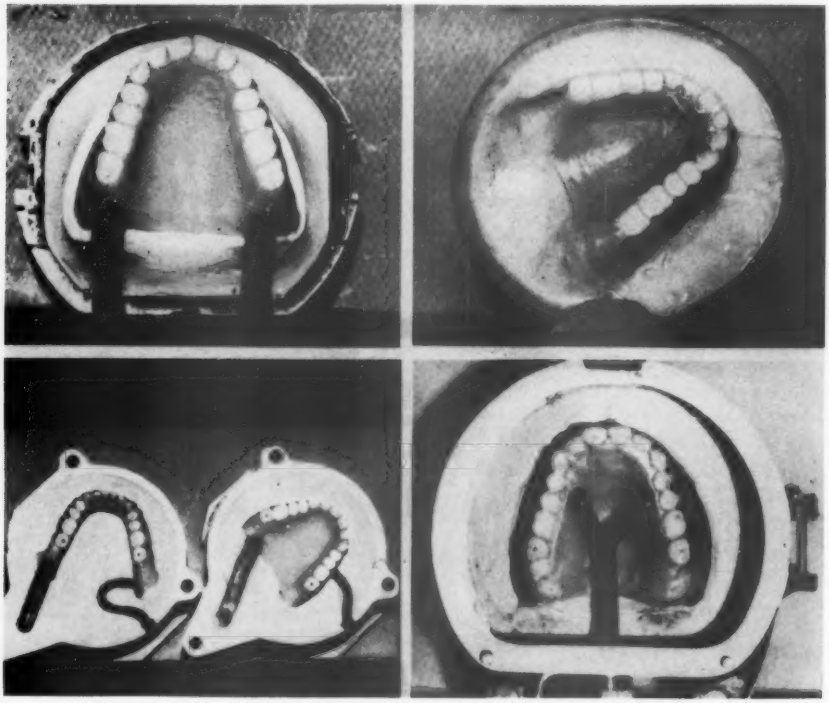

Fig. 2 • Above left: Wax denture in lower half of modified flask showing pouring sprue and riser for venting mold in Epoxolon technic

Above right: Partially deflasked Hydro-Cast denture showing diaphragm that confines hydraulic force to the tongue side of denture during curing

Below left: Lower halves of Jectron flasks containing wax model dentures with large sprues and small vents

Below right: Wax dentures and Y-shaped sprue used in some injection technics

and hinged flask recommended for use with Epoxolon. The authors modified conventional flasks as suggested in the directions of the manufacturer. The lower half of one of these flasks with the wax denture and pouring sprue and riser is shown in Figure 2, above left. The epoxy resin was cured at from 43 to 52°C. (110 to 125°F.) according to the manufacturer's instructions.

The instrument for processing Hydro-Cast dentures (Fig. 1, above center) uses hydraulic force on the tongue side of the dentures during curing. This hydraulic force is exerted through the gypsum in the upper half of the flask and is confined to the tongue side of the denture by the diaphragm that extends from the border of the denture to the outside edge of the flask (Fig. 2, above right). The platens (H) were heated to 93°C. (200°F.) prior to insertion of the flasks, and were kept at this temperature for one hour. The flasks were then cooled in five minutes by circulating tap water through the manifold (M).

Jectron dentures were made in the injection apparatus and flask shown in

Figure 1, above right. A precured rod of Jectron is heated to 210°C. (410°F.) in the injection cylinder (I) which is screwed into the preheated flask (F). This flask assembly is bolted to the platform (P). The screw ram (R) engages in the top of the charged injection cylinder (I). The motor (M) drives the ram forcing the softened Jectron into the mold encased by the flask (F). The lower halves of Jectron flasks containing the wax model dentures with the ingress sprues and vents are illustrated in Figure 2, below left.

A cross-sectional view of the equipment used in processing Luxene 44 dentures (Fig. 1, below left) explains this injection method. Compressed air is fed into the air gun cylinder (C) which drives the piston (P) forcing Luxene 44 (gel form) into the mold (M). A single sprue was used for the upper denture and a three-way sprue for the lower denture. The flasks were at 96°C. (205°F.) for 1¼ hours and were then bench cooled.

Figure 1, below center, shows a battery of three Tilon processing units. Compressed air is fed into the injector (I) forcing Tilon (gel form) into the mold within the flasks (F). The components of the flask are made of alloys with different heat conductances so as to initiate the polymerization on the tissue side of the denture. Heat is applied only to the bottom side of the flask through the platen (P) which was preheated to 110°C. (230°F.). The flasks were held at this temperature for at least 40 minutes and then bench cooled.

A Y-shaped sprue was used for both upper and lower dentures except on the thick lower dentures where a four-way sprue was attached. An example of a Y-shaped sprue on an upper denture is shown in Figure 2, below right.

Four of the Vacalon technic dentures were processed in the manufacturer's laboratory under reduced pressure using the equipment shown in Figure 1, below right. The flask assembly (F) was placed in the muffle of the oven (O) which was set at 66°C. (150°F.) for one hour. The oven temperature was gradually raised to 193°C. (380°F.) in 2½ hours and was held at 193°C. for one hour. During the heating and during cooling to 93°C. (200°F.) a partial vacuum (737 mm. of mercury) was maintained in the muffle of the oven by vacuum pump (P in Figure 1, below right). Approximately a year later, the manufacturer processed a set of four technic dentures of Vacalon in the dental research laboratories at the National Bureau of Standards. He placed the flask assembly in the oven at 71°C. (160°F.) for 1¼ hours. The oven temperature was gradually raised to 138°C. (280°F.) in a half hour and was held there for three quarters of an hour. A partial vacuum (660 mm. of mercury) was maintained.

The other denture base materials were compression molded with conventional flasks in accordance with the manufacturers' instructions.

Test Dentures • Four technic complete dentures were made of each material listed in Table 1. One set was thin; the other thick in cross section (Fig. 3). The average volume of the base of the dentures after polishing was 11 ml. for the thin uppers; 11 ml. for the thin lowers; 20 ml. for the thick uppers, and 25 ml. for the thick lowers. The sets of thin dentures were nearly identical in shape, as were the sets of the thick dentures. Trubyte Bioform combination technic teeth-mold 42F (with Pilkington-Turner posterior teeth) were used for all the technic dentures. In addition to these technic dentures, eight clinical dentures (five complete upper and three complete lower dentures) were made of each material (Table 1) with the following exceptions: two dentures were made of Miracle 50, Mystic 100, and hard rubber; no clinical dentures were made of Vacalon. Vacuum-fired porcelain anterior and 33 degree posterior

teeth were used for all clinical dentures.

The dentures were processed in the dental research laboratory at the National Bureau of Standards with the following exceptions: the Luxene 44 and hard rubber dentures were processed by Rothstein Dental Laboratories, Inc.; the Tilon dentures by the manufacturer in his laboratory and by the investigators using equipment in the Naval Dental School, Bethesda, Md.; and the Vacalon dentures by the manufacturer in his laboratory and at the National Bureau of Standards.

The same batches of denture bases, gypsum, and tinfoil substitutes were used for both the technic and clinical dentures. With few exceptions the clinical dentures were made for patients who are on the permanent staff of the National Bureau of Standards. With the exception of patients with very recent extractions or those needing immediate dentures, none was refused. Thus, seemingly easy and difficult conditions were accepted without selection as the patients came. In all but two instances the patients had worn dentures previously.

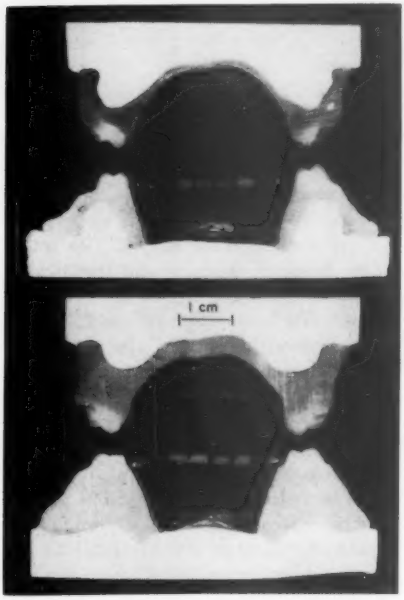

Fig. 3 • Cross sections of sets of technic dentures made distal to first molars

Fig. 4 • Device used in measuring vertical discrepancies in occlusal relations that occurred during processing. P is incisal guide pin; G, dial gauge; B, base with stops (S) for accurate repositioning of articulator

Impression and Jaw Relation Technics • The following impression technic was used: an individual preformed tray of self-curing poly(methyl methacrylate) was made; border molding and postdam were accomplished with "green" modeling compound; and the final impression was a corrective wash of zinc oxide-eugenol paste. Face-bow transfer and beeswax (centric and protrusive) interocclusal records were used in mounting the gypsum casts on a Hanau Model H articulator. All dentures were remounted on the articulator and corrections were made from a new centric interocclusal record taken at the time of insertion.

VERTICAL DISCREPANCIES IN OCCLUSAL RELATIONS

Method of Measurement • Metal split remounting plates (Hanau) were used

Table 2 • Increase in vertical occlusal relations

Material	Complete upper and lower dentures*		Single clinical dentures†	
	Number of sets of dentures	Average vertical increase in height of incisal guide pin	Number of dentures	Average vertical increase in height of incisal guide pin
		mm.		mm.
Hydro-Cast	4	0.00‡	1	0.00‡
	5	0.33	1	0.10
Epoxolon	5	0.33	2	0.33
Luxene 44	5	0.62	2	0.36
Hard rubber	1	0.65	0	—
Jectron	6	0.65	2	0.28
Duraflow	8	0.68	2	0.41
Vernonite powder-liquid	5	0.68	2	0.41
Acralite 88	4	0.75	3	0.65
Miracle 50 & Mystic 100	6	1.10	0	—
Tilon	7	1.29	0	—
Vacalon	4	1.49	0	—

*Included both technic and clinical dentures.

†Values for a single denture will, of course, be less than for a set of dentures, so data in the two columns giving the average increase are not directly related.

‡There was an interocclusal space between the upper and lower molar teeth of from ¼ to ½ mm. Differences in the rate of applying the hydraulic force, differences in the proportionate amount of the surface of the teeth in contact with the wax and with the gypsum, and differences in the amount of resin between the surface of the cast and the ridge lap of the teeth all have their effect and may account for the space between the molar teeth in these Hydro-Cast dentures.

in forming all gypsum casts. Then the gypsum casts could always be repositioned accurately on the articulator. The articulator, with the wax dentures mounted in the desired relationship, was positioned by stops on a heavy metal base to which was fastened a rigid upright arm holding a dial gauge (Fig. 4). The reliability of the method was tested by removing the articulator from the device, followed by removing and replacing the casts on the articulator and then by repositioning the articulator in the device. The discrepancy in the prior and subsequent readings was never greater than $\pm$ 0.04 mm.

The initial reading on the dial gauge (G in Figure 4) of the vertical position of the incisal guide pin (P) was taken with the completely formed wax dentures on the articulator immediately prior to flasking. The next reading was taken with the processed dentures (unremoved from their respective casts) replaced on their mounting and with the articulator accurately repositioned on the base (B). The difference between these two readings showed the discrepancy in the occlusal relationship caused by processing. All readings were made with the casts in centric relation with each other. (On the Hanau Model H articulator this would be represented by the balls in the condyle slots being forward.) The data are shown in Table 2.

Changes in Vertical Occlusal Relations • Four sets and a single denture of Hydro-Cast showed no vertical increase in the height of the incisal guide pin (P in Figure 4) (Table 2) but did show a depression of the molar teeth. All of the bicuspids, because of their shape and size, were not similarly depressed. Otherwise there would have been a decrease in the height of the pin since the anterior teeth were not set in contact in centric occlusion. This retraction of the molar teeth toward the casts is caused by the hydraulic pressure of 400 to 600 psi against their occlusal surfaces. An error of this type is more difficult to correct than an error of similar size caused by interceptive

Table 3 • Measurement schedule for dentures*

Molar-to-molar measurements only
Wax denture in lower half of flask
Wax denture flasked to occlusal and incisal surfaces of teeth
Processed resin denture with investment removed to occlusal and incisal surfaces of teeth
Resin denture on cast with flasking investment removed†
Molar-to-molar and flange-to-flange measurements
Denture removed from cast and immersed in water for ½ hour
Polished and stored for 24 hours in water‡

*All measurements and water storage were at 22 ± 1°C. (72 ± 2°F.).

†In 66 dentures reference pins were inserted in the border of the buccal flanges before the cured denture was removed from the gypsum cast. This was done by cutting away a small section of the cast overlying the border of the flange above the second molar.

‡Periodic measurements are being continued after storage in water (technic dentures) and after use (clinical dentures). These data will be presented in another report.

molar or bicuspid contact. Five sets and a single denture of Hydro-Cast had small increases (an average of 0.33 mm. and 0.10 mm., respectively) in the pin height (Table 2). It would appear that the flask design, the preformed flash or diaphragm, and the hydraulic pressure used in the Hydro-Cast technic minimize the increase in the vertical occlusal relations during processing.

Epoxolon dentures had a similar small increase (0.33 mm.). This is understandable since the flasks are fastened together when the thin fluid is poured into the mold. Little or no force is exerted against the resin and the curing temperature (43 to 52°C. [110 to 125°F.]) is very low.

There is no significant difference (0.65 to 0.68 mm.) among the next five materials (Luxene 44, hard rubber, Jectron, Duraflow, and Vernonite). Acralite 88 (a self-curing acrylic resin) showed a slightly larger vertical opening of the incisal guide pin (0.75 mm.). The slight difference between this value and those of the previous five materials is probably due to a slight hardening of the resin before the final closure of the flask could be accomplished.

The resins containing glass fibers (Miracle 50 and Mystic 100) averaged slightly over 1 mm. pin opening for six sets of dentures. These resins are somewhat stiff at packing consistency, and the glass fibers make it difficult to trim off the flash perfectly while trial packing. The Tilon dentures averaged 1.29 mm. for seven sets of dentures. Some of this change can be attributed to movement of the biscuspids adjacent to the sprue attachment. The four sets of Vacalon technic dentures with an average increase in pin opening (1.49 mm.) were processed by the manufacturer.

The data in Table 2 show that the acrylic resins processed with conventional compression molding reproduce occlusal relationships as satisfactorily as special resins and special processing technics.

The metal-to-metal contact of the halves of the flask does not in itself prevent an increase in height of the incisal guide pin. Any force that distorts the investment or causes the movement of teeth into it increases the height. Such forces may be produced by packing, injecting, polymerizing, and heating methods.

The average increase in the height of the incisal guide pin for 31 sets of technic dentures (in which Pilkington-Turner posterior teeth were used) was 0.89 mm. with a standard deviation about the mean of 0.61 mm. In contrast the aver-

age increase for 28 sets of clinical dentures (using 33 degree posterior teeth) was 0.61 mm. with a standard deviation about the mean of 0.46 mm. The greater value for the technic dentures is probably due to the sharper and more definite anatomy of the Pilkington-Turner posterior teeth which were selected to make the conditions in the technic dentures as critical as possible.

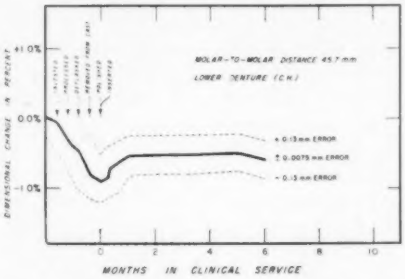

Fig. 6 • Effect of measurement error on data

CHANGES IN MOLAR-TO-MOLAR DIMENSION

Method of Measurement • Linear measurements on each denture (molar-to-molar) were made at various times (Table 3) at 22 ± 1°C. (72 ± 2°F.) with a toolmaker's microscope and were recorded to the nearest 0.0025 mm. (0.0001 inch). The reference marks were fine cross lines ruled on polished stainless steel pins cemented in the second molars as shown in Figure 5. Posterior linear measurements instead of contour measurements were made, as a previous study[6] had shown that linear changes occurring across the posterior portion of a denture are of significantly greater magnitude than in any other area. Also the changes occurring in the posterior region are the most important in the retention of dentures because of the anatomy of the mouth and the shape of the dentures. Finally, contour measurements with the available instrument,[12] or with modifications thereof,[13,14] are much less accurate than linear measurements.

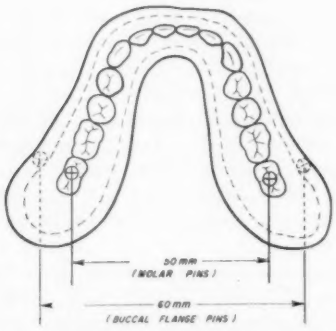

Fig. 5 • Drawing of lower denture showing location of stainless steel reference pins in molars and in buccal flange borders. Molar-to-molar and flange-to-flange distances here given vary with individual denture

The necessity of having the measurements as precise and as accurate as possible is shown in Figure 6. With an error of ± 0.13 mm., recorded data would fall on either one of the outer dotted lines. Many of the linear changes occurring in a denture are smaller than this error. Errors in measurement of such magnitude would seriously affect comparisons among materials and technics. With a plus error for one denture and a negative error for another, the true picture could be obliterated. However, a skilful observer using a calibrated microscope and good reference lines can hold the error in measurement to within ± 0.0025 mm. Differences among various observers may increase this error two to three times. With an error of ± 0.0075 mm., recorded data would fall in the solid line (Fig. 6).

Because the denture base resins (without filler) have a high coefficient of thermal expansion [(75 ± 15) × 10^{-6} per °C.] it is necessary to have good temperature control. As stated in Table 3, measurements were made at 22 ± 1°C. Even this latitude allows an error of ± 0.008 per cent (0.004 mm.) on a 50 mm. molar-to-molar span.

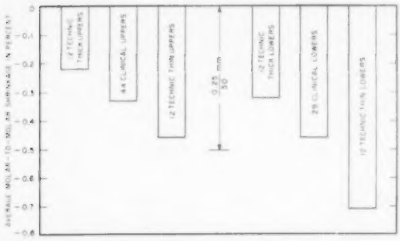

Fig. 7 • Relationship of bulk and shape of denture to average molar-to-molar shrinkage during processing. Fiducial measurement was made on wax denture flasked to occlusal surfaces of the teeth and final measurement was made after polished denture had been stored in water for one day

The high coefficient of thermal expansion of these denture resins must be considered in interpreting the data obtained at 22 ± 1°C. (72 ± 2°F.). If the dentures were heated to mouth temperature (37°C. [98.6°F.]) an expected approximate increase of 0.12 per cent should be added to all of the measurements made at room temperature.

The experimental design permitted the accurate measurement of linear changes in both technic and clinical dentures during processing and subsequently, using a method employed formerly.[1,6,15] In addition, the effects of the size and shape of the dentures on the dimensional changes during processing, on storage in water, and during clinical service could be determined. Then, too, the precise difference in the behavior of technic dentures stored in water and of clinical dentures in service could be learned. The detailed report of these observations will be given in a subsequent paper.

Molar-to-Molar Dimensional Changes • The relationship of the bulk and shape of a denture to average molar-to-molar shrinkage is shown in Figure 7. The thick upper and lower technic dentures had the same general pattern of dimensional change as the thin upper and lower technic dentures, but the average change for the thick dentures was smaller (Fig. 7). The four bars in Figure 7, representing data on technic dentures, show the average molar-to-molar change on 12 dentures of identical shape (Fig. 3), each made of a different organic denture base material (Table 1).

The thin upper technic dentures shrank 2.1 times as much on the average as the thick upper ones; the thin lower technic dentures, over 2.2 times as much on the average as the thick lower ones (Fig. 7). These findings were contrary to expectations as the dentures containing the most resin should have the greatest volumetric shrinkage on polymerization. Why then did the bulky dentures show less molar-to-molar change than the thin dentures? Probably the dentures with the thicker cross section were stiff enough to prevent release of some of the strain when the cured dentures were removed from the casts. The average shrinkage of the lower technic dentures was 1.5 times as much as the average shrinkage of the upper technic dentures. This relationship is probably due to gross difference in the shape of upper and lower dentures.

The average molar-to-molar changes of the upper and lower clinical dentures fall between those of the thick and thin technic dentures (Fig. 7). This general relationship has continued after the clinical dentures have been in service for 1½ years and the technic dentures have been immersed in water for 1½ years. If this pattern continues for several years, the construction and measurement of a technic denture in the laboratory made from the materials listed in Table 1 would probably constitute a valid test for dimensional changes of denture base resin in service.

Figure 8 shows graphically the average molar-to-molar changes after flasking, curing, removal from the cast and polishing, for the four technic dentures of each material (Fig. 3). The changes after flasking and curing are small as compared with the changes occurring when the den-

tures were removed from their gypsum casts. The comparatively large shrinkages in the dentures, caused by their removal from the gypsum casts, include the shrinkages which always occurred on removing the sprues on Luxene 44 and Tilon dentures (Fig. 2, below right) and the diaphragms on Hydro-Cast dentures (Fig. 2, above right). The additional change after polishing and storage in water for 24 hours was usually small and probably indicates the release of additional strain.[16]

The amount of shrinkage that occurred when the dentures were removed from their casts was close to 0.2 per cent for Acralite 88 and Epoxolon, and between 0.3 and 0.5 per cent for the other materials. This shrinkage was probably caused by the release of elastic strain when the denture was removed from the cast. The strain was probably placed in the denture by the greater contraction of the resin than of the gypsum mold during cooling. The two resins showing the least change, Acralite 88 and Epoxolon, were processed at 22°C. (72°F.), and 45°C. (113°F.), respectively, whereas the other materials had to be cured at much higher temperatures. The increase in curing

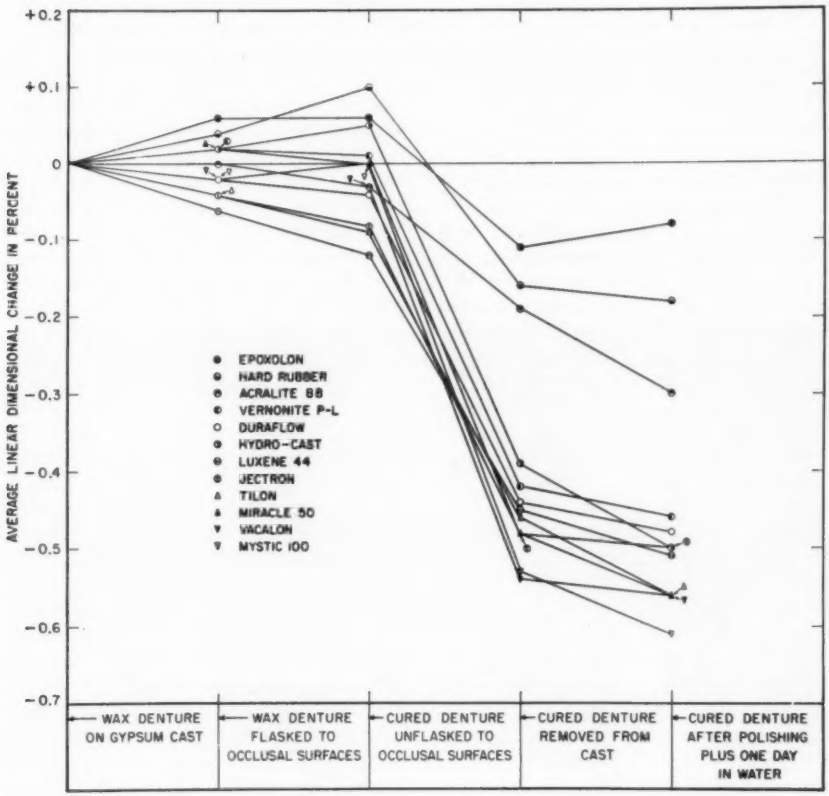

Fig. 8 • Average molar-to-molar changes on four technic dentures during processing (one thick and one thin, upper and lower)

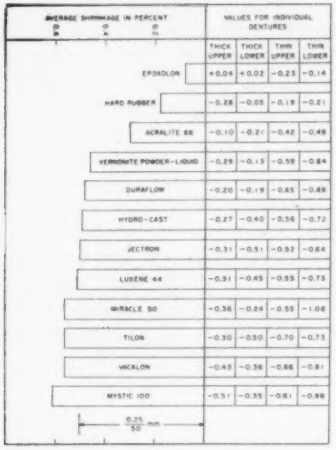
AVERAGE SHRINKAGE IN PERCENT
VALUES FOR INDIVIDUAL DENTURES
THICK UPPER
THICK LOWER
THIN UPPER
THIN LOWER
EPOXOLON +0.04 +0.02 −0.23 −0.14
HARD RUBBER −0.28 −0.05 −0.19 −0.21
ACRALITE 88 −0.10 −0.21 −0.42 −0.49
VERNONITE POWDER-LIQUID −0.29 −0.13 −0.58 −0.84
DURAFLOW −0.20 −0.19 −0.65 −0.68
HYDRO-CAST −0.27 −0.40 −0.56 −0.72
JECTRON −0.31 −0.51 −0.52 −0.64
LUXENE 44 −0.31 −0.45 −0.55 −0.73
MIRACLE 50 −0.36 −0.26 −0.55 −1.06
TILON −0.30 −0.50 −0.70 −0.73
VACALON −0.45 −0.36 −0.66 −0.81
MYSTIC 100 −0.51 −0.55 −0.81 −0.98
0.25 mm
50

Fig. 9 • Molar-to-molar change on four technic dentures during processing. (Total change from wax denture to polished denture stored for one day in water)

temperatures caused by exothermic heat given off during polymerization was not measured. The high temperature and pressure during vulcanization weaken the gypsum, and it is possible that in this state the gypsum is not able to exert a strong restraining force on the hard rubber during cooling. This may account for the low value of approximately 0.3 per cent, when the hard rubber dentures were removed from the casts.

The molar-to-molar changes that occurred while fabricating each type and shape of technic denture of each base material (Table 1) are shown in Figure 9 together with a bar chart giving average changes. The Vacalon dentures cured in the manufacturer's laboratory at a maximum temperature of 193°C. (380°F.) had an average shrinkage of 0.56 per cent. The four Vacalon dentures processed by the manufacturer in the dental research laboratory at the National Bureau of Standards had a lower maximum processing temperature (138°C. [280°F.]) and consequently had a lower average shrinkage (0.42 per cent). The differences in the average molar-to-molar shrinkages among the nine resins having the highest shrinkages processed at comparatively high temperatures (71° to 210°C. [160° to 410°F.]) are small, barely over 0.1 per cent (0.05 mm. on a 50 mm. molar-to-molar span). Differences of this order are largely academic and certainly have no practical significance. Thus the choice of a resin or a processing method among these nine would have to be made on some other basis than dimensional accuracy during processing. In fact, even the greatest differences in shrinkage among the clinical dentures made of the materials shown in Figures 8 and 9 could not be detected clinically by either the patient or the dentist at the time of insertion.

Figures 8 and 9 show that Epoxolon dentures have a very low shrinkage on polymerization. Unfortunately this low shrinkage on curing is offset by poor color stability, a tendency to collect stain rapidly, and a high expansion in water (technic dentures) and in service (clinical dentures). The expansion of the clinical dentures is so great that the porcelain teeth are loosening and many replacements have been made in the first 18 months of service. Dimensional changes in service will be reported in a subsequent paper.

Dimensional Changes Shown by Cross-Sectioning Upper Dentures in the Flasking Gypsum • Gypsum molds containing processed technic upper dentures were removed intact from the metal flasks and cross-sectioned. Inspection of these cross sections showed how well the different materials and technics filled the molds and how well the processed dentures fitted the gypsum casts prior to deflasking. The best adaptations of the thin and thick dentures to the gypsum casts were seen in the cross sections of Epoxolon, Hydro-Cast, Jectron, Luxene 44, Tilon and Vacalon dentures. The others had poorer adaptation than the foregoing but

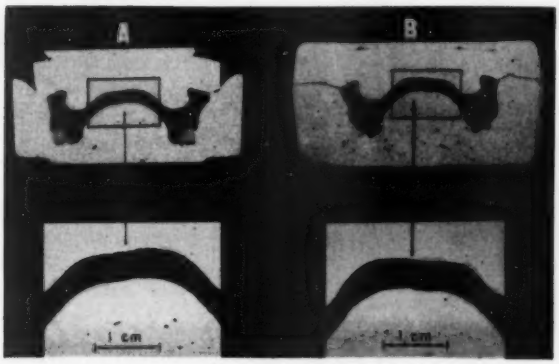

Fig. 10 • Cross section of processed thick upper dentures illustrating good (A) and poor (B) adaptation to gypsum casts

the differences were small as shown in Figure 10.

The use of hydraulic force directed toward the tongue-cheek side of the denture during polymerization does force the resin unidirectionally as shown by the cross section of the thin upper technic denture (A in Figure 11). If the hydraulic force is applied on the tissue-borne side of the denture, then the resin is not adapted to the cast (B in Figure 11). Of course, this is not done in practice but is included here as additional evidence of the effect of the unidirectional hydraulic force. However, when the conventional compression molding technic was used (C in Figure 11), the adaptation to the cast was just as good as

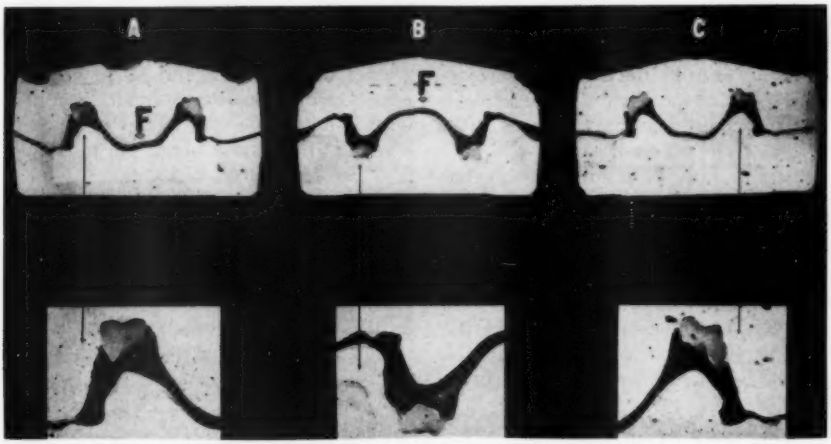

Fig. 11 • Cross section of thin upper technic denture processed: (A) with hydraulic force (F) directed toward tongue-cheek side of denture, (B) with the hydraulic force (F) directed toward tissue-bearing side of denture, (C) conventional compression molding. A, processed by manufacturer; B, reverse direction of hydraulic force; C, compression molded in Hydro-Cast flask

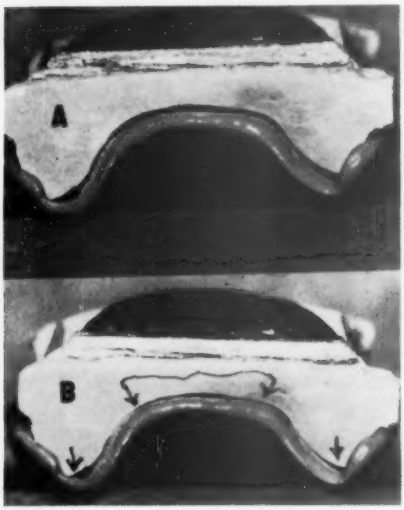

Fig. 12 • Replacement of clinical upper denture on gypsum cast on which it was cured. Molar-to-molar and flange-to-flange shrinkage of this denture was 0.4 per cent on removal from this gypsum cast. When denture was replaced on cast lightly, the adaptation was as shown in A. Adaptation was somewhat better and molar-to-molar and flange measurements were stretched (0.4 per cent) to their former dimensions when denture was forced on cast as shown in B, but discrepancies in the fit are still apparent

when the hydraulic force was used (A in Figure 11). In fact, there seems to be no advantage in using the hydraulic force as far as the fit of the denture to the gypsum cast is concerned either before or after removal from the cast.

There is little or no relationship between the adaptations of the dentures to the gypsum casts as seen in the cross sections and the molar-to-molar shrinkages that occur when the dentures are deflasked and removed from the casts (Fig. 8). These shrinkages prevent the dentures from seating properly on the gypsum casts on which they were cured.

DISTORTION OF DENTURES

The relative deformation of the posterior section of an artificial denture can be judged by the molar-to-molar and flange-to-flange shrinkages. As stated before, a large percentage of the linear shrinkage, from the wax denture to the polished denture, occurs when the denture is removed from the gypsum cast on which it was cured. When the denture is replaced lightly on the cast it will not fit (A in Figure 12). In this instance both molar-to-molar and flange-to-flange shrinkages were 0.40 per cent when the denture was removed from the cast. Even when the denture was forced back onto the cast it would not fit (B in Figure 12) exactly. These discrepancies appear large when a hard denture is seated on a hard cast. But in the mouth such a change had no apparent effect on the fit of the denture. This denture was comfortable when inserted and has remained so for one year (August 1958-59).

More distortion should occur if there were large differences between the molar-to-molar and flange-to-flange shrinkages. Generally the flange-to-flange shrinkage in upper dentures was greater proportionally than the molar-to-molar shrinkage when the denture was removed from the cast. The reverse was true in the lower dentures where the molar-to-molar shrinkages were generally proportionally greater than the flange-to-flange shrinkages. The differences were small, amounting to an average of 0.12 per cent with a standard deviation about the mean of 0.10 per cent on 66 dentures.

SUMMARY

The relative accuracy of the fit of 186 complete dentures (73 clinical and 113 technic) was determined: (1) by comparing the position of the incisal guide pin of a Model H Hanau articulator before and after curing the dentures; (2) by measuring the molar-to-molar shrinkage from the wax model denture to the polished denture; (3) by examining cross sections of cured dentures surrounded by

the flasking gypsum; (4) by noting the fit of polished dentures on the casts on which they were cured and by correlating the fit with molar-to-molar and flange-to-flange shrinkages; and (5) by observing the relative fit of the dentures in the mouth.

These dentures were made with eight different types of acrylic resins, a polystyrene, a vinyl-acrylic copolymer, an epoxy resin, and hard rubber (Table 1). These 12 different organic denture base materials were processed with the equipment and the method recommended by the manufacturer. Four technic complete dentures (thick and thin uppers and lowers) and usually eight complete clinical dentures were made of each material.

The changes in the occlusal relationships, as evidenced by the increase in the height of the incisal guide pin before and after processing, ran from 0.00 to 1.49 mm. The least average change in height of the pin (0.00 to 0.33 mm.) was on the dentures made of an acrylic resin processed by directional hydraulic compression molding or of an epoxy resin where the resin was poured into the mold. The highest average change (1.49 mm.) was on dentures made with an acrylic resin processed with a high temperature-vacuum cure. The severity of the changes of the other materials and methods fell in between the foregoing. In some instances there was an interocclusal space between the upper and lower teeth of from 0.25 to 0.5 mm. in the dentures of acrylic resin processed by the directional hydraulic compression molding.

The data in Table 2 show that special resins and special methods of processing them do not make for significantly greater accuracy of reproducing occlusal relationships than do the acrylic resins with conventional compression molding.

Molar-to-molar changes across the posterior section of the dentures were measured on a toolmaker's microscope under adequate temperature control when: (1) the wax denture was on the gypsum cast; (2) the wax denture was flasked to the occlusal surfaces; (3) the denture was cured and the occlusal index was removed; (4) the denture was removed from the cast on which it was cured; and (5) the denture was cleaned, polished, and stored one day in water.

The average molar-to-molar shrinkage of the thin technic dentures of all materials was approximately two times that of the thick dentures. Probably the dentures with the thicker cross section were stiff enough to prevent release of some of the strain when the cured dentures were removed from the casts.

The average molar-to-molar shrinkage of the lower technic dentures was 1.5 times as much as that of the upper technic dentures. This relationship is probably due to the gross difference in the shape of the upper and lower dentures.

The molar-to-molar changes on the clinical dentures followed the general pattern of the technic dentures.

The largest part of the molar-to-molar processing shrinkage occurs when the cured denture is removed from the gypsum cast. This is apparently caused by the release of elastic strain produced when the high-expanding resin is cooled in the low-expanding gypsum mold. Materials processed at low temperatures have in general less molar-to-molar shrinkage when the denture is removed from the cast.

The differences among the molar-to-molar changes on the different materials appear large on the chart (Fig. 8 and 9) but they are not clinically significant since they could not be detected by either the patient or the dentist at the time of insertion.

The molar-to-molar changes during curing of dentures made with an epoxy resin were lowest. This good property is offset by the poor color stability, a tendency to collect stain rapidly, and such a high expansion in service that the porcelain teeth are separating from the base.

The largest average molar-to-molar

change (0.7 per cent) amounts to 0.35 mm. on a 50 mm. molar-to-molar span. The differences in average molar-to-molar shrinkages among the nine resins processed at comparatively high temperatures are small, barely over 0.1 per cent (0.05 mm. on a 50 mm. molar-to-molar span). Thus, the choice of a resin or a processing method within this group of nine resins would have to be on some other basis than dimensional accuracy during processing.

The gypsum molds containing the processed technic dentures were removed intact from the metal flasks and cross-sectioned. The best adaptation of the dentures occurred in the poured epoxy resin, an acrylic resin processed by directional hydraulic compression molding, a polystyrene resin using transinjection molding, a vinyl-acrylic copolymer injection molded, and an acrylic resin gel injection molded in a special flask intended to propagate the polymerization directionally. The other resins and methods showed poorer adaptation. However, there is little or no relationship between the adaptation of the dentures to the gypsum casts as shown in the cross sections and the molar-to-molar shrinkages that occur when the dentures are deflasked and removed from the casts. Once a denture is removed from the gypsum cast on which it has been cured, the denture, when replaced on the cast, will not fit it.

Thus, all of the dentures show a distortion. This distortion is least when the percentage changes in the molar-to-molar and the flange-to-flange distances are small and approximately equal. On 66 dentures reference pins were inserted in the flanges (after removing a small section of the cast to expose the flange in the second molar area) before the cured denture was removed from the cast. The changes on these dentures were small, that is, 0.12 ± 0.10 per cent, showing that no large and clinically detectable deformations were occurring.

The conventional acrylic resins processed with the usual dental technic of compression molding are just as stable in dimension as the special resins and technics investigated.

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The anticariogenic effectiveness of a single application of stannous fluoride in children residing in an optimal communal fluoride area. II. Results at the end of 30 months

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Of two groups of children living in a community which fortifies its water supply with fluorine at the optimal level, the experimental group received single topical applications of an 8 per cent aqueous solution of stannous fluoride at six-month intervals throughout a 30 month period. The control group was treated with single topical applications of distilled water. The results at the end of 6, 12, 18, 24 and 30 months showed a significant reduction in the incidence of dental caries in the children receiving stannous fluoride topically.

In a previous paper[1] a clinical study was described in which a single application of an 8 per cent solution of stannous fluoride was given every six months to children who had lived in a fluoride area during the development of their teeth. At the end of six months and one year a significant anticariogenic effect was observed. This paper summarizes the study at its completion and includes data for 18, 24 and 30 month periods.

The methods employed in this study have been reported previously in detail.[1] In essence, the study involves the application of a single topical treatment of an 8 per cent aqueous solution of stannous fluoride at six-month intervals to one group of children according to the method described by Muhler,[2] and an application of distilled water at the same intervals to another comparable group of children when both groups have lived all their lives in a community under the conditions previously described.[3] Since 1950 the water supply of this community has been fortified continuously with the optimal level of fluorine furnished as sodium silicofluoride.

DATA AND DISCUSSION

The balance, according to initial caries experience as a function of age and sex, is shown in Tables 1 through 5. At the six-month period the mean initial DMFS rates were 6.06 for the control group and 6.17 for the stannous fluoride group. For the group completing the 12 month period, the mean initial DMFS rates were 5.76 for the control group and 6.18

Table 1 • Initial DMFS, age and sex distribution of subjects who completed 6 months

Age in years	Control						Test					
	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS
6	7	1.00	7	1.28	14	1.14	13	1.08	6	2.17	19	1.42
7	18	1.33	15	0.67	33	1.03	13	1.77	15	2.47	28	2.14
8	18	2.28	22	2.55	40	2.42	27	2.63	18	3.78	45	3.09
9	21	4.09	15	6.07	36	4.92	18	4.33	18	2.78	36	3.56
10	16	3.87	17	7.00	33	5.48	18	3.72	13	6.23	31	4.77
11	13	7.15	10	12.00	23	9.26	12	7.50	6	6.17	18	7.06
12	13	6.62	7	14.85	20	9.50	10	16.50	8	8.62	18	13.00
13	6	18.50	11	17.18	17	17.56	9	11.33	12	17.58	21	14.90
14	9	14.00	3	34.00	12	19.00	7	16.86	1	17.00	8	16.88
15	0		2	9.50	2	9.50	1	11.00	3	24.00	4	20.75
16	0		0		0		1	7.00	2	8.00	3	7.67
17	0		0		0		0		1	15.00	1	15.00
Total	121		109		230		129		103		232	

for the stannous fluoride group. After 18 months the mean initial DMFS rates were 5.52 for the control group and 6.11 for the stannous fluoride group. At the end of 24 months the control group had a mean initial DMFS rate of 5.41 and the stannous fluoride group, 5.65, whereas at the end of the 30 month period the rates were 5.72 and 5.58, respectively, for the control and the stannous fluoride groups.

The dental caries data at the end of 18, 24 and 30 months are shown in Table 6 along with the data for the 6 and 12 month periods. These data are limited to an analysis of those teeth present at the initial examination. At the end of 18 months the control group had a caries increment of 1.80 new DMF teeth and 3.49 new DMF surfaces. The group receiving the stannous fluoride had a caries increment of 1.16 new DMF teeth and 2.23 new DMF surfaces. This is a difference of 36 per cent in terms of both the DMFT and DMFS indexes and is highly significant as judged by their low probabilities. The breakdown of the DMFS index into its component surfaces

Table 2 • Initial DMFS, age and sex distribution of subjects who completed 12 months

Age in years	Control						Test					
	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS
6	6	0.83	7	1.29	13	1.08	11	0.91	6	2.17	17	1.35
7	17	1.53	14	0.57	31	1.10	12	1.92	13	1.08	25	1.48
8	15	2.33	20	2.55	35	2.46	23	2.65	15	3.87	38	3.13
9	17	4.06	15	5.93	32	4.94	14	4.28	17	2.88	31	3.52
10	13	4.31	15	7.27	28	5.89	16	3.31	11	5.55	27	4.22
11	12	6.50	8	11.38	20	8.45	12	7.50	6	6.17	18	7.06
12	11	5.82	6	19.00	17	10.47	10	16.50	6	9.00	16	13.69
13	6	18.50	6	14.33	12	16.42	9	11.33	10	17.90	19	14.79
14	4	13.50	2	31.50	6	19.50	7	16.86	1	17.00	19	14.79
15	0	—	1	5.00	1	5.00	1	11.00	2	30.50	3	24.00
16	0		0		0		0		2	8.00	2	8.00
17	0		0		0		0		1	15.00	1	15.00
Total	101		94		195		114		91		205	

Table 3 • Initial DMFS, age and sex distribution of subjects who completed 18 months

Age in years	Control						Test					
	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS
6	6	0.83	6	1.50	12	1.17	8	0.62	6	2.17	14	1.29
7	11	1.55	10	0.50	21	1.05	12	1.92	11	1.09	23	1.52
8	14	2.64	16	2.38	30	2.50	20	2.25	11	4.18	31	2.94
9	16	3.94	14	5.64	30	4.73	13	4.23	16	2.87	29	3.48
10	10	4.60	12	6.50	22	5.64	13	4.00	10	5.50	23	4.65
11	12	6.50	8	11.38	20	8.45	11	7.82	5	6.20	16	7.31
12	9	6.11	5	18.60	14	10.57	7	17.43	5	10.00	12	14.33
13	4	17.25	6	14.33	10	15.50	8	11.38	9	18.33	17	15.06
14	4	13.25	1	47.00	5	20.00	5	13.80	1	17.00	6	14.33
15	0	—	1	5.00	1	5.00	1	11.00	2	30.50	3	24.00
16	0		0		0		0		2	8.00	2	8.00
Total	86		79		165		98		78		176	

Table 4 • Initial DMFS, age and sex distribution of subjects who completed 2 years

Age in years	Control						Test					
	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS
6	4	0.25	3	2.33	7	1.14	5	1.00	2	3.00	7	1.57
7	7	0.57	8	0.50	15	0.53	10	2.10	10	1.20	20	1.65
8	10	3.40	12	2.33	22	2.82	17	2.12	11	4.00	28	2.86
9	13	3.62	11	5.73	24	4.58	11	4.55	15	2.67	26	3.46
10	9	4.22	10	5.60	19	4.95	9	4.00	7	5.86	16	4.81
11	9	5.33	3	12.00	12	7.00	6	7.83	5	6.20	11	7.09
12	9	6.11	4	18.00	13	9.76	6	15.17	3	10.30	9	13.56
13	2	22.00	6	14.33	8	16.25	5	12.40	4	16.75	9	14.33
14	3	14.33	0		3	14.33	5	13.80	1	17.00	6	14.33
15	0		1	5.00	1	5.00	0		1	43.00	1	43.00
16	0		0		0		0		1	8.00	1	8.00
Total	66		58		124		74		60		134	

Table 5 • Initial DMFS, age and sex distribution of subjects who completed 2½ years

Age in years	Control						Test					
	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS	No. males	Initial DMFS	No. females	Initial DMFS	Total	Initial DMFS
6	1	1.00	3	2.00	4	1.75	4	0.75	1	0.00	5	0.60
7	5	0.20	5	0.40	10	0.30	4	1.75	7	1.14	11	1.64
8	5	4.20	4	4.00	9	4.11	10	1.80	6	3.00	16	2.25
9	8	3.75	7	4.29	15	4.00	8	5.50	6	4.50	14	5.07
10	6	5.33	7	5.71	13	5.44	9	4.22	2	4.00	11	4.18
11	6	5.83	2	13.50	8	7.75	2	13.00	2	9.00	4	11.00
12	4	4.25	2	21.00	6	9.83	6	15.67	2	8.00	8	13.75
13	1	26.00	3	13.33	4	16.50	3	9.00	3	17.00	6	13.00
14	1	11.00	0		1	11.00	3	10.67	0		3	10.67
Total	37		33		70		49		29		78	

shows a reduction in caries for each surface type. The increments for proximal surfaces continue to show the greatest numerical differences. This was evident also in the 6 and 12 month data.

At the end of 24 months there were 124 children available for re-examinations in the control group and 137 in the stannous fluoride group. The increments in new caries were 2.11 and 3.91 in the control group and 1.13 and 2.53 in the stannous fluoride group for the DMFT and DMFS indexes, respectively. This is a reduction of 46 per cent when the DMFT index is used and 35 per cent when the DMFS index is used. Both of these reductions are significant statistically.

After 30 months, 148 subjects were available for re-examination. Since further loss in subjects could be expected if the study were continued, it was decided to terminate the study at the end of this examination period. In the control group there were 70 subjects who had a DMFT increment of 2.67 and a DMFS increment of 5.43. In the group treated topically with stannous fluoride there were 1.22 new DMF teeth and 2.76 new DMF surfaces. Both of these reductions are highly significant as shown by their low probabilities.

Taken collectively, these data demonstrate the increased anticariogenic benefit of topical stannous fluoride therapy as an adjunct for caries control even when the child's teeth have developed in the presence of optimal fluorides. It should be pointed out, however, that a significant proportion of the teeth which erupted prior to the study had fully developed crowns before the inception of

Table 6 • A comparison of the caries increments in two groups of children both of whom lived in an area containing the optimal amount of fluorine and one of which received a single application of distilled water at six month intervals and the other a single application of topical stannous fluoride throughout a 30 month period

Group	Number of subjects	Increments		Prox.	Occl.	B-L
		DMFT	DMFS			
		6 month data				
Control	230	0.88 ± .08	1.56 ± .13	0.57	0.64	0.34
Test	232	0.57 ± .08	1.00 ± .12	0.28	0.50	0.22
Reduction		35%	36%	51%	22%	35%
P=		.007*	.002			
		12 month data				
Control	195	1.41 ± .11	2.58 ± .21	1.06	1.04	0.48
Test	205	0.93 ± .09	1.81 ± .17	0.57	0.85	0.39
Reduction		34%	30%	46%	18%	19%
P=		.0007	.004			
		18 month data				
Control	165	1.80 ± .14	3.49 ± .28	1.36	1.42	0.70
Test	176	1.16 ± .10	2.23 ± .20	0.79	1.03	0.41
Reduction		36%	36%	42%	27%	41%
P=		.0014	.0014			
		24 month data				
Control	124	2.11 ± .19	3.91 ± .33	1.60	1.65	0.65
Test	134	1.13 ± .12	2.53 ± .27	0.31	1.10	0.61
Reduction		46%	35%	49%	33%	6%
P=		.0003	.004			
		30 month data				
Control	70	2.67 ± .31	5.43 ± .62	2.81	1.79	0.83
Test	78	1.22 ± .17	2.76 ± .38	1.13	1.18	0.45
Reduction		54%	49%	60%	34%	46%
P=		.002	.004			

*Computed on the basis of the student's "t" test.

Table 7 • A comparison of the caries increment in permanent teeth erupting during the study

	No. subjects	No. erupting teeth	New DMFT	New DMFS	Mean increment DMFT per 100 teeth	Mean increment DMFS per 100 teeth	% difference DMFT	% difference DMFS
			6 month					
Control	230	320	12	13	3.76	4.06	83	84
SnF_2	232	307	2	2	.65			
			12 month					
Control	195	541	46	50	8.50	9.24	78	80
SnF_2	205	588	11	11	1.87	1.87		
			18 month					
Control	165	612	93	102	15.20	6.70	77	79
SnF_2	176	602	21	21	3.48	3.48		
			24 month					
Control	124	694	119	129	17.18	18.60	74	76
SnF_2	134	682	31	31	4.55	4.55		
			30 month					
Control	70	286	54	59	18.80	20.61	74	76
SnF_2	78	304	15	15	4.94	4.94		

water fluoridation and that the crowns of all of the teeth which erupted during the study developed, in whole or in part, after the inception of water fluoridation.

Dentistry has recognized that children living in an area practicing communal fluoridation require treatment for the presence of dental lesions. Communal fluoridation is a significantly effective means of mass caries control, but caries still are found in the teeth of many children living in communities practicing it. The data in this study would suggest that a significant added benefit to the preventive dentistry program in such areas would be found in the use of the single topical treatment of stannous fluoride. Of further interest is the clinical observation that the effectiveness of this treatment procedure does not decrease with time.

Of particular interest to the field of preventive dentistry is the evaluation of caries-control measures by the caries experience in teeth erupting during the study period. Since this study has a duration of two and a half years, the anticariogenic effect resulting from topical stannous fluoride therapy as a function of the number of re-applications on newly erupting teeth is of considerable interest. Table 7 shows such a comparison. In 320 erupting permanent teeth in the control group, 12 teeth became carious with a total of 13 new lesions, whereas in the group which received one application of stannous fluoride there were only 2 affected permanent teeth and 2 new surfaces. This represents a difference of 83 per cent in new DMF teeth and of 84 per cent in new DMF surfaces. After 12 months there were 541 newly erupted permanent teeth in the control group. Of these, 46 teeth became carious with a total of 50 new surfaces. In the group receiving two single applications of stannous fluoride six months apart, there were 588 newly erupted teeth of which 11 were new DMF teeth with 11 new surfaces. This represents a difference of 78 per cent in the DMFT rate and of 80 per cent in the DMFS rate. After 18 months there were 612 newly erupted permanent teeth in the control group of which 93 became carious with 102 new DMF surfaces. In the group receiving three applications of stannous fluoride six months apart, there were 602 newly

Table 8 • The dental caries increment at the 24 month examination period of control and test children computing on the basis of all the teeth present in contrast to data in Table 7 where only the teeth present at the initial treatment period are used for comparison

Group	Number of subjects	DMFT	DMFS	Prox.	Occl.	B-L
Control	124	3.03 – .22	5.02 – .36	1.76	2.47	0.79
Test	138	1.51 – .15	2.92 – .29	0.83	1.38	0.72
Reduction (5)		50	42			
Probability		.0001	0002			

erupted permanent teeth of which 21 became carious with 21 carious surfaces. A difference of 77 per cent is represented in new DMF teeth and of 79 per cent in new DMF surfaces. After 24 months there were 694 newly erupted permanent teeth in the control group. Of these teeth, 119 were affected with 129 newly decayed surfaces. In the group receiving four single applications of stannous fluoride at six month intervals, there were 682 newly erupted permanent teeth of which 31 became carious with 31 new surfaces. A difference of 74 per cent is represented in new DMF teeth and a difference of 76 per cent in new DMF surfaces.

In contrast to Table 6, which shows the new caries increments only in those teeth present at the initial examination, Table 8 shows the data obtained in this study by computing the new caries increments according to all of the teeth at the 24 month examination period. When all teeth are evaluated there is an increment value of 3.03 for the DMFT index and of 5.02 for the DMFS index in the control group. For the test group, increment values are 1.51 and 2.92 respectively, for the DMFT and DMFS indexes, indicating reductions of 50 and 42 per cent. In contrast, the data in Table 6 show reductions of 46 and 35 per cent, respectively, whereas in Table 7, for which the caries increment is evaluated in terms of those teeth erupting during the 24 month period only, the data show reductions of 77 and 79 per cent, respectively, for the DMFT and DMFS indexes.

From the point of view of preventive dentistry, it is gratifying to note, in these data, the significantly increased benefit derived from single stannous fluoride applications at six-month intervals in children using fluoridated water. These data are of interest, since the group receiving the four single applications of stannous fluoride spaced six months apart had no new multiple-surface carious lesions. The implication of this is obvious: namely, that if a child receives the optimal amount of fluorine in the communal water supply from birth and, in addition, receives a single application of stannous fluoride each six months, a high degree of caries control is effected. Moreover, such control is not only possible but practical. In terms of restorative dentistry, the data of this study clearly suggest that not only the size of the lesion, but the number of lesions, can be reduced drastically by practicing "multiple principles of preventive dentistry" as has been suggested previously.[3]

At this date (1960), Indianapolis has been fluoridating its communal water with optimal amounts of fluoride for ten years. Unfortunately, no base line pre-fluoridation dental caries survey was made; therefore, the clinical effectiveness of communal fluoridation in this city is difficult to evaluate. However, it is possible to estimate its effectiveness from the limited data in this study by comparing the caries rate in the permanent teeth

erupting during the test with the caries rate for a group of children comparable in regard to age and sex living in Bloomington, Ind., where the fluoride content of the communal water is less than 0.1 ppm. Such a comparison is made in Table 9. The children comprising the Bloomington sample were subjects in a study in which each child received a dental examination and topical applications of distilled water each six months for a two year period and did not use a stannous fluoride dentifrice. Both the Indianapolis and Bloomington children were examined by the same dentist and treated in all ways as similarly as possible. After six months there were 406 newly erupted permanent teeth in the Bloomington children, and 48 of these became carious with 51 new surfaces. Compared with the rates for the Indianapolis children who had used fluoridated water, a difference of 68 per cent is represented for the DMFT index and of 63 per cent for the DMFS index. After 12 months there were 591 new permanent teeth in the Bloomington sample. Eighty-eight became carious with 99 new surfaces. Compared with the rates for the Indianapolis children, this represents a difference of about 35 per cent. At the end of 18 months 780 new permanent teeth erupted in the Bloomington children. Of these, 198 became carious with 220 new surfaces. A 30 per cent difference is represented in a comparison with the rates for the Indianapolis children. Similarly, after 24 months there were 945 newly erupting, permanent teeth in 189 Bloomington children. Two hundred and sixty-seven of these teeth became carious with 335 new surfaces affected. Here, a difference of 39 per cent is represented in new DMF teeth and of 48 per cent in new DMF surfaces. The most impressive fact that emerges from these comparisons is that in all instances the Indianapolis children have not only fewer carious teeth, but fewer affected surfaces. The 24 month data from Bloomington showed that 42 teeth had more than one affected surface. This multiple surface involvement was not due to prophylactic restorative dentistry since only three surfaces of the entire 68 affected were restored. These data, although not conclusive in themselves and although limited to restricted interpretation, suggest quite strongly that the children receiving fluoridated water in Indianapolis have many fewer carious lesions than children receiving nonfluoridated water in Bloom-

Table 9 • A comparison of the caries increments in permanent teeth erupting in children living in a fluoride area (Indianapolis) with a similar group of children living in a nonfluoride area (Bloomington, Ind.) during a two year study period

Group	No. subjects	No. erupting permanent teeth	New DMFT	New DMFS	Mean increment per 100 teeth DMFT	Mean increment per 100 teeth DMFS	% difference DMFT	% difference DMFS
			6 month data					
Indianapolis	230	320	12	13	3.76	4.06	68	63
Bloomington	237	406	48	51	11.82	12.52		
			12 month data					
Indianapolis	195	541	46	50	8.50	9.24	33	35
Bloomington	216	591	88	99	14.88	16.72		
			18 month data					
Indianapolis	165	612	93	102	15.20	16.70	30	31
Bloomington	198	780	198	220	25.20	28.21		
			24 month data					
Indianapolis	124	694	119	129	17.18	18.60	39	48
Bloomington	189	945	267	335	28.12	35.22		

ington. The comparison suggests also that the size and number of new dental lesions, as well as the amount of time required in restoring multiple surfaces cavities, are significantly smaller for the Indianapolis children.

CONCLUSIONS

The subjects of the current study were two groups of children, both of which reside in a community which fortifies its water supply with fluorine to the optimal level. At six month intervals throughout a 30 month period, the experimental group received single topical applications of an 8 per cent aqueous solution of stannous fluoride whereas the control group was treated with single topical applications of distilled water. The results at the end of 6, 12, 18, 24 and 30 months showed a significant reduction in the incidence of dental caries in the children receiving stannous fluoride.

The results of the study indicate there are benefits to be gained from a "multiple principle" approach to the achievement of optimal caries resistance.

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College Faculty Salaries and Student Costs Both Rising, Government Study Shows • Average salaries for full-time faculty members in 4-year undergraduate colleges have risen 10.6 per cent during the past 2 years, to an average of $6810 in the current academic year, the U. S. Office of Education recently announced. In 1957-58, the average was $6160. In 1958-59, it was $6490.

Figures for the 3 years are not precisely comparable because some colleges failed to answer the survey questions one or more times during that period. While approximately 1200 of the 1940 colleges and universities furnished information in 1957-58, more than 1400 responded in 1959-60. Institutions covered in the latest survey account for 91.1 per cent of the enrollment in public institutions and 80.4 per cent of the enrollment in private institutions.

For all institutions of higher education the rate of salary increase has averaged slightly less than 5 per cent in each of the past 2 years. However, during this period increases have been greater (8.2 to 13.5 per cent) in private institutions than in public ones.

The average salary in 4-year public institutions in the current academic year is $7040, an increase of 8.8 per cent over the $6470 of 1957-58. The average salary in 4-year private institutions in the current year is $6510, a 14.2 per cent increase over the $5700 of 1957-58.

In junior colleges and other 2-year institutions, the average salary for full-time faculty members is $6110 in 1959-60, an increase of 7.6 per cent over the 1957-58 figure of $5680. In public 2-year institutions, the current average salary is $6550, up 7.2 per cent from the $6120 of 1957-58. The figure for private 2-7-year institutions, $4640 this year, is an increase of 14.6 per cent over the $4050 of 1957-58.

The study, which was conducted by W. Robert Bokelman, chief of the Business Administration Section of the Division of Higher Education, also shows a slow but perceptible increase in costs for full-time students in both public and private institutions of higher education. For example, resident students in private institutions paid an average tuition fee of $615 in the current academic year, an increase of 16.9 per cent over the 1957-58 average of $526. Resident students in public institutions paid an average of $168 this year as against $155 in 1957-58.

Average charges for dormitory rooms for students is $168 for men and $174 for women in public institutions this year as against $155 for men and $160 for women in 1957-58. In private institutions, male students today are paying an average of $201 and women students $220 for dormitory rooms. In 1957-58 the figures were $182 for men and $194 for women. *Science 131:1429 May 13, 1960.*

Procedure for the determination of the noble metal content of dental gold alloys

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A procedure is described for determining the gold and platinum metals content of dental gold alloys. The silver, gold and platinum metals content may be determined separately if desired. The described method is considered to be accurate to within 0.1 per cent.

The determination of the noble metal content of a dental gold alloy is important because of its correlation with the corrosion resistance of the alloy. The term "noble metal content" as used here means the amount of gold and metals of the platinum group. The chief platinum metals encountered are platinum and palladium, but small amounts of rhodium and iridium may be present in the alloy, introduced as impurities in the metals used to make the alloy.

The procedure described here makes use of certain portions of a method published by Gilchrist[1] for the complete analysis of a dental gold alloy. It differs, however, in that glass electrodes, instead of indicator solutions, are used to establish acidities and alkalinities, and no attempt is made to separate the individual noble metals.

METALS USED

In preparing the synthetic mixtures for the experiments, the following metals were used:

1. Gold, purified by the authors, estimated by spectrochemical analysis to have a purity of 99.99 per cent.
2. Palladium, estimated to have a purity of 99.96 per cent.
3. Silver, prepared by the U. S. Mint, known to have a purity of 99.98 per cent.
4. Platinum, by thermoelectric measurement, 99.999 per cent.
5. Copper, standard melting point copper, by chemical analysis, 99.997 per cent.

REAGENTS USED

The reagents used were those that conformed to the specifications of the American Chemical Society for reagent grade chemicals.

Throughout this paper, whenever the use of an acid is prescribed with no indication of strength or dilution, the acid to be used is the concentrated acid. Dilutions are indicated by the volumes of acid and water mixed to prepare a diluted reagent. Diluted acid (1 + x) means a diluted acid prepared by mixing 1 volume of the concentrated acid with x volumes of distilled water. Similar designations are used for ammonium hydroxide.

Concentrated sodium hydroxide solution was prepared by dissolving from 30 to 40 Gm. of solid sodium hydroxide in about 100 ml. of distilled water.

Ten per cent solutions of sodium hydroxide, sodium carbonate and sodium

nitrite were prepared by dissolving 10 Gm. of each of the solid reagents in distilled water and diluting each such solution to a volume of 100 ml. It is to be noted that the sodium nitrite solution should be filtered before using it.

The solution of dimethylglyoxime was prepared by dissolving 1 Gm. of the solid reagent in 100 ml. of 95 per cent ethyl alcohol.

The sodium formate solution was prepared by dissolving 25 Gm. of the solid reagent in water and diluting it to a volume of 100 ml.

The ammonium formate solution was prepared by diluting 10 ml. of formic acid with about 500 ml. of distilled water, adjusting the resulting solution to pH 8.5 with ammonium hydroxide (1 + 1), and diluting to a final volume of 1 liter.

APPARATUS FOR MEASUREMENT OF HYDROGEN ION CONCENTRATION

A pH meter with a standardized glass-calomel electrode system, capable of measurement over a wide range of temperature and pH, was used to measure the pH of the various solutions.

PROCEDURE

Preparation of Sample • The sample is rolled into a ribbon 0.005 to 0.010 inch thick. This is done to insure more rapid and complete disintegration and solution of the sample. A 0.5 Gm. sample is recommended.

Decomposition of Sample • The 0.5 Gm. sample, accurately weighed, is placed in a 250 ml. beaker. The beaker is covered with a watch glass, and 5 ml. of distilled water, 2 ml. of nitric acid and 6 ml. of hydrochloric acid are added. This solution is heated on a steam bath. It is necessary to break up the silver chloride with a stirring rod from time to time. If disintegration is not complete in a reasonable length of time, more hydrochloric and nitric acid are added in the ratio of 3 to 1. If additional acids were added, the solution should then be evaporated to dryness and the original amounts of distilled water and acids added. After decomposition is complete, 150 ml. of distilled water is added and the solution continues to be heated on the steam bath until the silver chloride precipitate has coagulated. The solution is cooled and set aside for at least one hour.

Elimination of Silver • The solution is passed through a 9 cm. filter paper of close texture (Whatman no. 42 paper may be used). The precipitate and paper are washed at least ten times with diluted hydrochloric acid (1 + 99) at room temperature. The filtrate and washings are reserved for the determination of gold and platinum metals.

The silver chloride is dissolved with hot diluted ammonium hydroxide (1 + 1), and the filter is washed well with water. The filter may contain iridium and because of this, the filter should be placed in a porcelain crucible reserved for the determination of the platinum metals or noble metals.

If it is desirable to determine the silver content, the ammoniacal solution is acidified with nitric acid and diluted to 200 ml.; 2 ml. of hydrochloric acid is added. The solution is heated on the steam bath until the silver chloride has coagulated. The solution is cooled and set aside for at least one hour. By means of suction, the solution is filtered through a glass filtering crucible of fine porosity. The precipitate again is washed with diluted hydrochloric acid (1 + 99) at room temperature. The precipitate is dried at 110°C. (230°F.) for two hours and weighed; its silver content is calculated by means of the factor 0.7526.

If the silver content is not to be determined, the ammoniacal solution containing the silver is discarded. No significant losses of noble metals have been observed

by discarding this solution, unless the original silver chloride was extremely highly colored. To recover the small amount of noble metals which contaminated the silver chloride, the method described by Gilchrist[1] may be used. After the silver has been reprecipitated and filtered from the ammoniacal solution by acidifying it with nitric acid, the filtrate is evaporated and the ammino compounds are destroyed by treatment with hydrochloric and nitric acids. A few milliliters of sulfuric acid are added and the solution is heated until fumes of sulfuric acid are given off. Any metallic residue is dissolved by aqua regia. The solution is diluted with 50 to 100 ml. of water, then filtered to remove silica before adding the solution to the main filtrate containing the rest of the alloy in solution.

Precipitation of Gold • After the filtrate from the silver chloride precipitation is heated to approximately 80°C. (176°F.) on the steam bath, its pH is increased to between 1.5 and 2.0 by means of a concentrated sodium hydroxide solution. Ten milliliters of 10 per cent filtered sodium nitrite solution is added to precipitate the gold and the solution is heated again on the steam bath to coagulate the precipitate. Coagulation usually occurs in less than 15 minutes. The pH is increased to 3.0 by adding either concentrated or 10 per cent sodium hydroxide solution, and 5 ml. more of the filtered sodium nitrate solution is added to insure complete precipitation of the gold. The solution is heated again for a half hour on the steam bath.

The solution is filtered through a 9 cm. filter paper of close texture, leaving the bulk of the gold in the beaker. The stirring rod, beaker, gold and filter paper are washed at least ten times with hot distilled water. The filtrate and washings are reserved for the precipitation of platinum metals.

Next, the gold and original beaker are washed five times with hot diluted hydrochloric acid (1 + 9). The gold is transferred to the filter and washed thoroughly with hot distilled water.

If it is desirable to determine the gold separately, the filter paper and its contents are placed in a porcelain crucible. The filter is charred and ignited slowly. Finally, the gold is ignited at red heat in air for at least a half hour, cooled and weighed as metal.

If the total noble metal content is to be determined, the filter and its contents are placed in the crucible in which the insoluble residue obtained from redissolving the silver chloride was placed. The filter is slowly charred and ignited. This crucible and its contents are reserved for the addition of the precipitate of platinum metals.

Removal of Base Metals • To the hot filtrate and washings reserved from the gold precipitation, 10 Gm. of sodium chloride and 5 ml. of filtered 10 per cent sodium nitrite solution are added. The large amount of sodium chloride helps to keep the palladium nitrite complex in solution when palladium is present in large amounts. The sodium chloride may be added as the solid salt or as a solution. The pH is adjusted to 5 with 10 per cent sodium hydroxide solution. Then the pH is adjusted to 7.5 ± 0.1 with 10 per cent sodium carbonate solution to precipitate completely the base metals. The solution is heated for two hours on the steam bath. Its pH is readjusted to 7.5 ± 0.1, if necessary, at the end of the first hour of heating by adding more 10 per cent sodium carbonate solution.

The solution is filtered through a 9 cm. paper of close texture, and the precipitate of base metal is washed at least ten times with hot distilled water. The filtrate and washings are reserved for the determination of the platinum metals.

The base metals are dissolved by means of several washings with hot diluted hydrochloric acid (1 + 9) and the filter is washed again thoroughly with hot water.

These washings are diluted with distilled water to a volume of 150 ml. The resulting solution is cooled to room temperature and 10 ml. of 1 per cent alcoholic dimethylglyoxime solution is added to precipitate any traces of palladium. The solution is set aside for two hours. If a yellow precipitate has formed, the solution is passed through a filter paper of close texture, and the filter and precipitate are washed thoroughly with distilled water at room temperature. The filtrate and washings are discarded.

If palladium was present, the filter and precipitate are slowly charred and ignited in the crucible reserved for the determination of the noble metals.

Precipitation of Platinum Metals • Thirty-five milliliters of diluted sulfuric acid (1 + 1) is added to the filtrate from the precipitation of the base metals, and the resulting solution is evaporated to dryness on the steam bath. The residue is allowed to cool, and 6 ml. of sulfuric acid is added. The beaker and its contents are heated gently by swirling the beaker over an open flame until liquefaction occurs and boiling has stopped. Then it is heated more strongly until the white fumes of sulfuric acid are formed. It is allowed to cool, and the sides of the beaker are washed down with distilled water. The solution is reheated, boiled gently, and then heated strongly to produce fumes of sulfuric acid. The resulting salt cake is cooled, 200 ml. of diluted hydrochloric acid (1 + 99) is added, and the salts are dissolved by heating on the steam bath. The solution is filtered to remove silica derived from the glass during the fuming operation.

The acidity of the hot solution is adjusted with concentrated sodium hydroxide solution and, finally, with 10 per cent solution to a pH of 4. Then the pH is raised to 5.0 with a 10 per cent sodium carbonate solution. Ten milliliters of 25 per cent sodium formate solution is added to precipitate the platinum metals. The solution is placed on a steam bath for several hours or overnight to coagulate the precipitate.

The hot solution containing the coagulated precipitate is passed through a filter of close texture and the precipitate is washed at least ten times with a 1 per cent ammonium formate solution (pH = 8.5) at room temperature.

The filter and its contents are placed in the crucible reserved for the determination of the noble metals. The filter and precipitate are slowly charred and ignited in air. Finally, the residue is ignited in hydrogen, cooled in carbon dioxide and weighed as metal.

To obtain as correct a value as possible for the amount of the noble metals, it is necessary to take into account the small amount of impurities introduced through the reagents and analytical operations. Therefore, blank determinations should be made and the foregoing weight of metal corrected.

RESULTS

The results obtained when known mixtures of silver, gold, palladium, platinum and copper were handled by the foregoing procedure are given in the table. The determination of the noble metal content is found to be accurate within 0.1 per cent.

Discussion of the Procedure • When copper was used to represent the base metals, there was no apparent interference.

The precipitation of gold by sodium nitrite was found to be quantitative at pH 3.0.

The optimum pH for rapid and complete precipitation of the platinum metals was found to be between 5 and 6. When precipitation occurred at a pH of 5 and the solution was heated, the pH gradually increased to about 8.5 and coagulation occurred. If the pH remained less than 7, little or no coagulation resulted. If, on the other hand, the original pH

Table • Analysis of mixtures of typical components occurring in dental gold alloys

Sample number	Silver		Gold		Palladium	Platinum	Total platinum metals		Copper	Noble metals	
	Original (mg.)	Recovered (mg.)	Original (mg.)	Recovered (mg.)	Original (mg.)	Original (mg.)	Original (mg.)	Recovered (mg.)	Original (mg.)	Original (mg.)	Recovered (mg.)
1	47.8	47.8	426.2	426.2	—	—	—	—	26.2	426.2	426.2
2	60.8	60.8	400.4	400.4	15.6	—	15.6	15.4	25.2	416.0	415.8
3	51.9	51.8	250.3	250.4	125.1	—	125.1	125.1	75.4	375.4	375.5
4	61.3	61.3	376.8	376.8	—	17.0	17.0	16.9	50.5	393.8	393.7
5	50.0	49.9	250.9	250.9	—	125.7	125.7	125.6	75.7	376.6	376.5
6	50.8	50.6	300.3	300.4	35.4	65.7	101.1	101.0	50.6	401.4	401.4

was greater than 8, the precipitation was inhibited. At a pH of 10, precipitation was delayed for several hours.

The progress of coagulation of the platinum metals could be followed by stirring the solution and observing its appearance. Immediately after precipitation the solution was black and opaque. When coagulation of the precipitate began, some of the opacity of the solution was lost. The solution gradually became more transparent and had a bluish tinge when the coagulation of the precipitate was nearly completed. Finally, the solution became clear and colorless.

It was necessary to wash the precipitate of the platinum metals with an ammonium formate solution adjusted to pH 8.5 to prevent the formation of a colloidal suspension. This wash solution was completely volatile. Since the platinum metals had already been precipitated completely, no trouble was encountered from complexing by the ammonium ion. The presence of formate resulted in a reducing solution, and the ammonium ion adjusted the pH to that of the filtered solution. This wash solution of ammonium formate solved many of the problems encountered in washing the platinum precipitate free of sodium salts. Washing with dilute formic acid was useless because the precipitate would often be washed through the filter paper.

The need of a reagent blank was readily understood when it was realized that about 40 Gm. of sodium salts were present in the solution when the platinum metals were precipitated. A spectrochemical analysis of the precipitate from the reagents indicated that nickel, aluminum, silicon and iron were the major constituents.

CONCLUSION

A procedure for determining the noble metal content (gold and platinum metals) of dental gold alloys is described. In this procedure silver, gold and platinum metals content may be determined separately if desired. This method for noble metal content is considered to be accurate to within 0.1 per cent.

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The effects of the psychotherapeutic drugs, glutethimide, meprobamate and ectylurea on dental patients

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A double blind study was conducted to compare the 24 hour premedication effects of meprobamate, ectylurea, glutethimide and placebo in 196 dental patients. Evaluations were both subjective and objective. Glutethimide was the most effective in allaying the patient's anxiety, but also was the most toxic. Ectylurea and meprobamate were no more effective than the placebo. The investigators judged the placebo to be more effective than either meprobamate or ectylurea, and only slightly less effective (54 per cent) than glutethimide (62 per cent). None of the drugs tested is the final answer to pretreatment anxiety in dental patients.

Excitability and anxiety are almost universal characteristics of dental patients. These emotional symptoms are more pronounced in patients visiting a dentist than in patients in almost any other area of health service. With the advent of new technics, methods and instruments, much of this apprehension is needless. Nevertheless, because of previous knowledge and vicarious experiences, fears continue to persist. Various methods currently are being used to allay such feelings toward impending dental treatment, and these include hypnosis, sedation, general anesthesia and the ataraxic drugs. A recent survey[1] shows that almost 50 per cent of dentists are giving their patients some form of tranquilizing agent, primarily on an empirical basis. However, several well-controlled studies have been reported.[2-9] Studies on dental patients were reported by Lund and Anholm,[6] Lefkowitz[7] and Szmyd, McCall and Enright[8] with varying results.

This study attempts to assess the effects of 24 hour premedication with ataraxic drugs on apprehensive dental patients. Because of the known difficulties in evaluating ataraxic drugs, a double blind test was used comparing glutethimide, meprobamate and ectylurea with a placebo.

MATERIALS

Glutethimide (alpha-ethyl-alpha-phenyl-glutarimide)[10] is a nonbarbiturate sedative whose principal effect is depression of the central and autonomic nervous system. The electroencephalographic sleep patterns are similar to those seen with secobarbital and chloral hydrate. There is no analgesic effect even in large doses. The effects on the cardiorespiratory system are nominal even in large doses, and there is no hypotension or respiratory depression with a therapeutic dose of 0.5

to 1.0 Gm. The action of glutethimide when given by mouth begins in 5 to 25 minutes, and the maximum effect is achieved in 30 minutes. The duration of action is four to six hours.[2]

Isaacs[3] used this agent in normal patients and found that 500 mg. of glutethimide was equivalent to 1.5 grains pentobarbital in producing hypnosis. The principal side reactions at this dosage level were unusual fatigue and sleepiness, lightheadedness and dizziness, ataxia, lack of concentration and apathy.

Toxic responses were reported in four cases by Kier, Whitehead and White.[4] These patients had consumed amounts varying from 5 to 10 Gm. of glutethimide in combination with alcohol or a barbiturate. All patients recovered following lavage and dialysis. Drugs such as alcohol and barbiturates which are central nervous system depressants react synergistically with glutethimide. Allergic reactions have been reported consisting of rubelliform rashes and exanthems which disappeared when the drug was discontinued.

Branch and Pastorello[2] advocate the use of glutethimide in combination with scopolamine or meperidine as a safe and effective premedication regimen for children undergoing general anesthesia. It was found to decrease fear and anxiety in these children and made them more susceptible to suggestion.

Meprobamate (2-methyl-2-n-propyl-1, 3-propanediol dicarbamate)[11] is a nonbarbiturate interneuronal blocking agent belonging to the group of drugs known as substituted propanediols. The compound is known to possess definite relaxant properties which relieve both psychic stress and muscular spasm without significant effect on the circulatory, respiratory or other autonomic functions. Berger[5] found meprobamate more effective than the barbiturates for alleviation of emotional stress.

The side reaction most commonly seen is drowsiness. This is most likely to appear in children and in adult patients on high dosage levels. Allergic manifestations have been reported to range from mild skin rash to syncope. The agent is approximately one fifth as toxic as the barbiturates.

Lund and Anholm[6] studied 53 dental patients (33 were children 2 to 15 years old) who had received meprobamate as premedication or for relief of nervous tension during denture adjustment. The authors reported that improvement in behavior and in submission to treatment was good to excellent in 82 per cent of the patients. Drowsiness was noted in a few of the smaller children, one adolescent and one adult, but caused no inconvenience. The authors concluded that meprobamate is a valuable adjunct to dental practice.

Lefkowitz[7] studied 423 patients over 18 years of age, using a double blind technic with patients categorized as excitable, apprehensive or normal. The first two groups were those requiring premedication prior to dental treatment. Lefkowitz used a 400 mg. meprobamate tablet which was given three times a day prior to treatment. His conclusions were that the majority of apprehensive and excitable patients may be expected to accept dental care with more composure after receiving meprobamate.

Szmyd, McCall and Enright[8] made a clinical evaluation of promazine hydrochloride and meprobamate in the control of postoperative sequelae in patients undergoing oral surgery. The results with these drugs, as compared to a placebo, indicated that there was no significant effect on the postoperative sequelae of pain, swelling and trismus. These agents also failed to influence the postoperative narcotic demand, and the number of days lost because of convalescence was significantly increased. The authors conclude that neither promazine hydrochloride nor meprobamate can be recommended for the control of postoperative sequelae in oral surgery.

Ectylurea (2-ethyl-cis crotonylurea)[12] is an agent that produces mild depression of the central nervous system, an action shared with other substituted urea compounds. It does not influence blood pressure, pulse, respiration, gastric acidity or motility, nor does it produce skeletal muscle relaxation, analgesia or anticonvulsant effects. The potential use of the drug is as a neurosedative or calming agent, and it is not considered a hypnotic. The toxicity of ectylurea is extremely low. Side reactions to the drug have been mostly skin rashes of mild effect and short duration.

Bauer and others[9] reported the use of ectylurea in 172 patients with tension, anxiety and insomnia. They concluded that this agent is of very low toxicity, permits daytime sedation without mental depression and induces normal sleep by alleviating tension and anxiety. There is one report of jaundice after two weeks of ectylurea therapy.[13] It was suggested that this syndrome of cholangiolytic hepatitis was a rare allergic mechanism apparently induced by ectylurea.

PROCEDURE

A double blind clinical study was established to compare the 24 hour premedication effects of meprobamate, ectylurea, glutethimide and placebo on 196 dental patients with symptoms of anxiety and tension. This study initially comprised two groups of patients as follows: Group A: 90 patients, mostly adults from private practices. All received 24 hour premedication with either glutethimide or placebo. Seventy-one patients, or 80 per cent, were women between the ages of 12 and 85 years. The average age was 33 years.

Group B: 106 patients from the Children's Mercy Hospital and the University of Kansas City Pedodontic Clinic. All children received treatment from a single investigator (D.H.). All received 24 hour premedication with meprobamate, ectylurea or placebo. Sixty of the patients, or 56 per cent, were girls between the ages of 10 and 17 years. The average age was 11.5 years.

The three drugs and the placebo were placed in capsules of identical size and color and each drug and placebo then was individually packaged in identical packets of four capsules. Each capsule contained 400 mg. of the active agent except ectylurea (300 mg.). All of the packets were randomized by the manufacturer in a box containing 120 packets per box. Each packet was coded and the code list was entrusted to the compounding pharmacist and to the project coordinator (W.J.C.). The code list was not to be opened unless serious side reactions should develop in the patient taking one of the agents.

A record sheet was kept for each patient receiving the packet of four capsules. The top half of the sheet was for recording the packet code number, name, age, sex, type of dental treatment plan and the emotional status of the individual. The bottom half of the record sheet was completed on the return visit. It contained spaces for recording the taking of capsules, the effect of the agent on the patient, side effects, the desirability of repeating the prescription and the dentist's observation of the person as a dental patient. Objective signs such as sweating of the forehead and palms were noted as was the ease of patient care.

A single packet containing four capsules was given to the patient or, in the case of a child, to his parent with instructions that one capsule should be taken at each of three times during the day preceding the dental appointment and on the morning of the appointment. The patients were told that the capsules were intended as an aid for them prior to their appointments. They were given no information as to the type of medication and also no mention was made of the possibility of side reactions. If there was any problem concerning the taking of the

capsules, they were to call the attending dentist.

Several of the Kansas City practitioners (Mid-Century Dental Study Club members)[14] who were evaluating glutethimide and a placebo noted early in the studies severe side reactions such as drowsiness, vertigo and emotional upsets in their patients. It was thought best to halt this part of the study, and accordingly, further evaluation of glutethimide and placebo on patients in Group A was discontinued. The method of evaluating subjective and objective symptoms are here outlined. The subjective symptoms were derived from the patients' own words as to how they felt about the impending dental appointments and how they reacted to the procedures at hand.

Some of these conditions are abstract in nature and some are more applicable to a specific age group. The symptoms include hesitancy in being seated, a negativistic attitude, resistance toward simple procedures such as the oral examination or having roentgenograms taken, obvious fear of local anesthetic procedures and, in general, a resentment toward the dentist.

The objective signs were those observed by the dentist treating the patient. During the first appointment each patient was checked for reaction to anxiety and apprehension. Those patients selected expressed a fear of most dental procedures, used excuses to postpone the appointment and related "bad experiences" in other dental offices. They usually hesitated in allowing an immediate thorough examination and refused to cooperate fully in any of the routine procedures. On the second appointment, after a 24 hour premedication period, all positive signs and symptoms previously recorded were reviewed with the patient. The patient was asked if his feeling toward the appointment was different or better than before. The dentist looked also for an increase or decrease in "nervousness" and a greater or lesser willingness to cooperate and to have routine operative procedures performed. Patient improvement was recorded only when there was pronounced change or when a completely uncooperative patient permitted some constructive treatment. The dentist noted also the presence of parasympathetic sweating of both the forehead and the palms of the hands during the visit.

RESULTS

The results of this clinical study are presented in the table. The agent glutethimide, although too reactive for complete comparison, was found to be the most effective in rendering the patient more susceptible to dental treatment. As may be noted in the table, 72 per cent of the patients believed that this drug made them feel less apprehensive toward their impending dental appointment. It was also noted that the investigators were slightly less impressed with the results achieved with glutethimide and gave it a score of 62 per cent. The side reactions, as mentioned earlier, were more numerous with glutethimide and more intense. Seventy-eight per cent of the patients experienced some form of reaction to the drug and five patients felt they were worse for having taken the agent. Most of the reactions were due to drowsiness, but some had more severe symptoms. One patient felt depressed, four had signs of vertigo and four maintained that they were too sleepy to return for the appointment.

The results for the drugs ectylurea and meprobamate and for the placebo were identical as regards the patients' feelings of improvement and the dentists' observations of their effects. The reactions which patients experienced were considerably less frequent and severe in the placebo group than in the two experimental groups, but reactions such as drowsiness were recorded in all three groups. A chi square test performed on

Table • Results of clinical trials using a double blind technic on dental patients with agents glutethimide, ectylurea and meprobamate

Drugs used	Subjective symptoms*						Objective symptoms*					
	Improved		Same		Worse		Improved		Same		Worse	
	No. patients	Per cent	No. patients	Per cent	No. patients	Per cent	No. patients	Per cent	No. patients	Per cent	No. patients	Per cent
Glutethimide	36	72	9	18	5	10	31	62	14	28	5	10
Ectylurea	16	44	19	53	1	3	16	44	19	53	1	3
Meprobamate	13	41	18	56	1	3	13	41	18	56	1	3
Placebo	34	46	40	54	—	—	40	54	34	46	—	—

*Subjective symptoms: the patient's description of his feelings of anxiety or tension towards the dental appointment. Objective symptoms: the dental practitioner's observations of persons as dental patients, including evaluation of signs such as sweating of the forehead and palms.

these two agents and compared with the results with the placebo showed no significant differences. One patient taking meprobamate had emesis after taking the first capsule and another patient became more excited after taking the series. Three patients taking ectylurea had minor side effects such as stomach-ache, hyperexcitability and tinnitis. There were no severe side reactions reported in the placebo group.

It was interesting to note that the placebo was more effective than either meprobamate or ectylurea as seen by the investigators. In fact, it was only slightly less effective (54 per cent) than glutethimide (62 per cent). This tends to reduce the level of significance of glutethimide as an effective antiapprehensive agent. The dentist's observation on the ease of handling patients is the major point under consideration in this study, especially in the adolescent patient. Answers to the question as to whether the patient would like the prescription repeated, were evenly divided between "yes" and "no" for glutethimide, ectylurea and for the placebo. However, only one third of the group taking meprobamate desired renewal of the drug.

DISCUSSION

The need for an agent to be used to reduce the anxiety and tension of dental patients toward an impending dental appointment has been established. Hollister[15] has stated that tranquilizing drugs have established, for better or worse, a place in medical therapy. This does not preclude the need for additional studies, especially those that are well-controlled and include placebo comparison. Shapiro and Teng[16] emphasize that the nonpharmacological variables such as the doctor-patient relationship and the impact of psychologic changes in the patient which tend to mimic and occasionally mask the pharmacological effect of a drug make the placebo a necessity in clinical investigations. In regard to pain experienced by the patient, Maurice[17] has found that it may be intensified by psychic factors. Beecher,[18] commenting on the powerful placebo effect, observed that the placebo was effective in 35.2 per cent of cases when used in conjunction with other agents for relief of pain, headache, anxiety and tension. He maintains that the placebos are more effective when stress is greatest and can also produce therapeutic and toxic reactions. Wolf and Pinsky,[19] studying the effect of placebo and mephenesin, found almost the same amount of improvement of certain patient symptoms with each agent.

Glutethimide, with the exception of its high percentage of side reactions, comes nearer to being an effective agent in the calming of dental patients. This

seems to be a characteristic common to this group of drugs, in that the more effective they are, the more toxic they become in many of the patients receiving the drug. It is interesting to note the dissimilarity between the objective symptoms recorded by the dentist and the subjective symptoms reported by the patients for glutethimide. The objective symptoms are only slightly greater (62 per cent) than those for the placebo (54 per cent). Redish and Ping[20] also noted a divergence between subjective and objective symptoms when they evaluated ethinamate (Valmid) in a double blind study. The divergence was slight in the improved groups but became greater in the questionable or "no help" categories. The patient's feelings toward the dental appointment certainly should be considered, but if the practitioner's observations are considered as at least equally reliable, results with glutethimide become less significant.

In a comparison of ectylurea, meprobamate and the placebo in this study, there is little divergence between the subjective or objective responses. A comparison of ectylurea and meprobamate favors ectylurea slightly but not to a degree that is clinically significant. Both drugs were found to be neither very toxic nor especially objectionable to the patient. However, unless the psychic changes manifested in these patients are more elusive than was supposed, these drugs are apparently no more effective than placebo. This study does not prove any of the tested drugs to be the final answer to pretreatment anxiety in dental patients. Further analysis of these agents should take into consideration an increased dosage for ectylurea and meprobamate and a lengthened premedication period.

CONCLUSION

A double blind study was conducted to compare the effects of glutethimide, ectylurea, meprobamate and placebo in 196 dental patients. Glutethimide proved the most effective in allaying patients' emotional conditions but was also the most frequently toxic. Ectylurea and meprobamate were no more effective than the placebo and were only slightly more reactive than the placebo. This study does not provide an answer to the treatment of anxiety in dental patients in reference to the afore-mentioned drugs.

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Biological effects of various cutting methods in cavity preparation: the part pressure plays in pulpal response

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The contribution of applied pressure to the pulpal responses resulting from operative procedures was studied, utilizing three contra-angle air turbines to prepare cavities in 42 teeth in vivo. The teeth were extracted within 24 to 48 hours and examined histologically. Coolants, although adequate to prevent burn lesions, do not minimize inflammatory responses when the operative technic requires an applied force above 8 ounces. It can be assumed that greater pressures increase the severity of the pulpal inflammatory response.

In histopathological studies of the dental pulp, investigations have been directed mainly to lesions produced by excessive frictional heat created by rotational instrumentation. Other studies have demonstrated that increasing pressures elevate pulpal temperatures. Consequently, it has been recognized that pressure contributes to the lesions developed. Massler[1] stated that when a coolant was used, heavy continuous pressures probably produced more damage than light intermittent pressures. As yet, there have been no investigations of specific pulpal pathologic conditions resulting from excessive pressures as compared with those caused by excessive heat.

With the advent of efficient cooling methods, frictional heat became readily controllable, even at the higher speeds. Peyton[2,3] demonstrated that an air-water spray can limit temperature rises to less than 20°F. at speeds ranging from 2,000 to 170,000 rpm. Our results[4] corroborated Peyton's findings since only seven of over 400 specimens prepared with an air-water spray revealed histologic evidence of excessive temperature rise. Since frictional heat is apparently controllable, other variations in pulpal pathologic conditions perhaps can be explained on the basis of differences in applied pressures determined by the design of the instrument and the requirements of an operative technic.

Morrison and Grinnell[5] clarified the meaning of the term "pressure," often incorrectly used in the dental literature, as the resulting effects of two factors under the control of the dentist: (1) force, that is, the gripping of the handpiece, its position and application to the

tooth, and (2) area, that is, the amount of the cutting tool in contact with the tooth surface at any instant.

Jeserich,[6] in 1935, showed that forces applied by dentists in cavity preparations ranged from 1 to 25 pounds and that the resulting thermal changes were almost directly proportional to these forces. Also, the direction of force played an important role. The combination of a downward force to gain depth and a lateral force to gain extension produced significant thermal changes. Force on the pulpal wall of the cavity produced heat in a region of dentin closer to the pulp than did force on the lateral walls of the cavity. He advocated the use of hand forces of from one half to four pounds while operating at 1,500 to 2,000 rpm, and avoidance of downward forces on the pulpal floor of the cavity.

Henschel,[7] in 1943, stressed the physical law that the total frictional resistance is independent of the area of contact, and for two given surfaces, such as steel and dentin, it depended only on the thrust or force between them. This suggested to him that the smallest bur could develop as much heat per dentinal tubule as the larger burs. However, Peyton[3] and Jeserich[6] have demonstrated that the larger burs of each type developed slightly greater temperature rises than the smaller burs.

Walsh and Symmons[8] reported that a force of less than one ounce (20 Gm.) was necessary to produce a satisfactory rate of removal of enamel at 60,000 rpm as compared to a force of from one to one and one-half pounds (400 to 600 Gm.) at 3,000 rpm. The low-speed technic required 30 times as much force as the high-speed technic. This is easily understandable as explained by the formula utilized by Morrison and Grinnell:[5]

$$P(\text{pressure}) = \frac{F}{A}\ \frac{(\text{force})}{(\text{area})}$$

Thus, when wheel-type stones of different sizes are compared, the smaller stone develops more pressure because of the smaller area of contact. In order to have the small stone operate at the same pressure as the larger stone, it would be necessary to reduce the force applied with the smaller stone. If the forces on the smaller stone are reduced to gain equal pressure on the tooth, it is obvious that the larger stone will remove more tooth structure because there is more surface feet per minute contact. In order for the smaller stone to remove the same amount of tooth structure as the larger stone, it would be necessary to increase the surface feet per minute of the smaller stone by increasing the speed. The net result is to employ a smaller size cutting tool, and to use less force and a higher speed. The pressure at the point of contact is the same as with the larger stone but the forces applied in controlling and operating the instrument are reduced. Consequently, at the higher speeds the pressures are reduced from levels such as 40 to 80 pounds to 2 to 10 pounds.

Peyton and Henry[9] showed that a slight increase in forces may cause a greater degree of temperature rise than a corresponding increase in rotational speed, but diminished forces will not reduce temperature rise sufficiently to eliminate the need of a coolant.

In a previous study,[4] concerning the pathological alterations of the human pulp resulting from the use of various operative grinding technics ranging from 6,000 to 200,000 rpm with applied forces ranging from 1.0 to 24 ounces, we found the following:

1. The technics tended to fall into groups according to the prominence of certain histopathological characteristics seen within the lesions produced.

2. The prevalence of cellular infiltration and cellular displacement for the entire length of the experiment was greater when using the lower speed technics than the higher speed technics whether or not an adequate coolant accompanied the procedure (see Table 1).

Table 1 • Total length of experiment

Technics	No. of specimens	Average					
		Tooth size (code)	Preparation time (sec.)	Remaining dentin (mm.)	Intensity of displacement	Intensity superficial infiltrate	Intensity deep infiltrate
Group 1 (Lower speed-higher force)	120	3.03	42.3	0.88	1.18	1.20	1.07
6,000 rpm, 16–24 oz.:							
Spray (22 cc./min.):							
no. 37 diamond							
No coolant:							
no. 37 diamond							
20,000 rpm, 8–14 oz.:							
Spray (22 cc./min.):							
no. 37 diamond							
No coolant:							
no. 37 diamond							
Group 2 (Higher speed-lower force)	246	2.65	22.2	0.88	0.30	0.34	0.39
50,000 rpm (water turbine), 3–8 oz.:							
Spray (75 cc./min.):							
no. 36 diamond							
150,000 rpm (belt driven), 2–4 oz.:							
Spray (18 cc./min.):							
no. 35 carbide							
200,000 rpm (air turbine), 1–3 oz.:							
Spray (35 cc./min.):							
no. 35 carbide							
Air-jet:							
no. 35 carbide							

3. There were no changes in the prominence of these characteristics at the lower speeds when a no. 35 carbide bur was substituted for the no. 37 diamond stone, despite the absence of burn lesions.

4. Minimal pathologic conditions developed when the 50,000 rpm, no. 36 diamond stone, water-jet technic was used as compared with those which developed when the 20,000 rpm, no. 37 diamond stone, air-water spray technic was used despite similar preparation times.[4]

These findings indicated that possibly pressure alone plays a significant role in contributing to the incidence and intensity of the inflammatory response as expressed in terms of cellular infiltration and displacement.

To determine whether or not this theory was tenable, the study was continued, utilizing additional human teeth prepared clinically and processed technically as previously described.[4]

MATERIALS AND METHODS

Three newly acquired contra-angle air turbines were utilized in this study. Two of these turbines were of American design with free running speeds of approximately 300,000 rpm and requiring 1 to 3 ounces of force. The third instrument, an imported product, represented a combination air turbine and gear-driven contra-angle handpiece. It operated at

about 50,000 rpm and utilized a force of 6 to 8 ounces. The authors were anxious to test the latter instrument since the same latchtype no. 37 diamond stone, which had been employed in the lower speed technics, could be used as the cutting tool. Forty-two teeth were prepared with these air turbines and extracted within 24 to 48 hours. It was felt that a more critical comparison of the aver-

Table 2 • Length of experiment, 24 to 48 hours

Technics	No. of specimens	Average					
		Tooth size (code)	Preparation time (sec.)	Remaining dentin (mm.)	Intensity of displacement	Intensity superficial infiltrate	Intensity deep infiltrate
Group 1 (lower speed-higher force)							
6,000 rpm, 16–24 oz.:							
Spray (22 cc./min.):							
no. 37 diamond	42	3.04	46.1	0.81	1.60	1.13	1.09
no. 35 carbide							
No coolant:							
no. 37 diamond							
no. 35 carbide							
20,000 rpm, 8–14 oz.:							
Spray (22 cc./min.):							
no. 37 diamond							
no. 35 carbide							
No coolant:							
no. 37 diamond							
no. 35 carbide							
Group 2 (Higher speed-lower force)							
50,000 rpm (water turbine), 3–8 oz.:							
Spray (75 cc./min.):							
no. 36 diamond							
50,000 rpm (imported turbine), 6–8 oz.:							
Spray (25 cc./min.):							
no. 37 diamond							
no. 37 carbide							
150,000 rpm (belt driven), 2–4 oz.:	62	3.10	22.7	0.72	0.80	0.74	0.67
Spray (18 cc./min.):							
no. 35 carbide							
200,000 rpm (air turbine), 1–3 oz.:							
Spray (35 cc./min.):							
no. 35 carbide							
Air-jet:							
no. 35 carbide							
300,000 rpm (air turbine-A), 1–3 oz.:							
Spray (30 cc./min.):							
no. 35 carbide							
Air-jet:							
no. 35 carbide							
300,000 rpm (air turbine-B), 1–3 oz.:							
Spray (50 cc./min.):							
no. 35 carbide							
Air-jet:							
no. 35 carbide							

Table 3 • Imported air turbine

Technics	No. of specimens	Average					
		Tooth size (code)	Preparation time (sec.)	Remaining dentin (mm.)	Intensity of displacement	Intensity superficial infiltrate	Intensity deep infiltrate
No. 37 carbide with air-water spray	19	2.32	24.8	0.69	0.42	0.47	0.58
No. 37 diamond stone with air-water spray	21	2.67	26.5	0.83	0.52	0.33	0.29

age intensities achieved when the lower speed or higher speed was used could be obtained during this interval when the intensity of the inflammatory response was most evident. The results from the previous study,[4] shown in Table 1, demonstrated the over-all average intensities of cellular displacement and cellular infiltration for the entire experimental period. The teeth in the present study were then grouped with the appropriate 24 to 48 hour specimens from the higher speed categories of the original study[4] to make a total of 62 such specimens as shown in Table 2, Group 2. Group 1 in Table 2, consists of the 24 to 48 hour specimens produced at the lower speeds in the same study.

Additional teeth were prepared with the imported turbine using both the no. 37 diamond stone and no. 37 carbide bur as cutting tools. The teeth were extracted between six and 30 days after the preparations were made to determine any differences in the degree of trauma to the pulp each cutting tool might produce, and to compare the results of the technics listed in Table 1 with the average intensities of cellular displacement and cellular infiltration resulting over a longer period of time. The results in Table 3 are derived from all the specimens (1 to 30 days) prepared with the imported air turbine.

The forces applied to the cutting tool and to the teeth were measured by means of a model no. 16 Hamilton Postal Scale, which was kept on the bracket table, as in the previous studies.[4] The forces exerted on the tooth by the handpiece were transferred several times to the postal scale for readings during the cavity preparation. A dental assistant recorded these values in ounces and the mean was derived at the end of each procedure to determine the approximate forces utilized.

RESULTS

The additional findings corroborated our original impression. Coolants, although adequate to prevent burn lesions, did not prevent an inflammatory response when the technic required an applied force greater than 8 ounces. The phase of massive leukocytic infiltration of the burn lesions produced when the low speed-high force technics were used remained minimal in intensity when the high speed-low force technics were used. Previously, it had been assumed that once a burn lesion was created in the pulp, regardless of the operative technic, massive leukocytic infiltration of the lesion would soon follow. Evidence of repair was found within the burned lesions of the higher speed specimens without this intermediate phase.

Although the average intensities of the inflammatory characteristics with the higher speed technics were not as low in the 24 to 48 hour period as in the over-all experimental period, the averages

were greatly reduced despite a slightly smaller average remaining dentin thickness value (Table 2).

The results obtained with the imported turbine (Table 3), employing the no. 37 diamond stone and no. 37 carbide bur as cutting tools, showed intensities of a low order comparable to those obtained with the previously studied high-speed technics employing smaller cutting tools.[9] The biologic response of the pulp was similar for both cutting tools.

DISCUSSION

The air-jet as a coolant is not adequate because burn lesions were found when all the higher speed technics were used. Since the total amount of pathologic alterations with the high speed-low force, air-jet technics was not as great as with the 6,000 and 20,000 rpm, without coolant, it is plausible to assume that the decreased pressure helped to minimize the inflammatory response. The air-jet may have lessened the damage somewhat, but Peyton has shown that air alone is not an effective coolant above 6,000 rpm.[10]

In comparing the results when the 20,000 and 50,000 rpm technics were used, the difference in the quantity of water supplied during the operation must be taken into consideration, since the water-jet supplied over three times as much water per minute as the air-water spray (see Table 1). Possibly this fact could have contributed to the decrease in pathological alterations with the 50,000 rpm technics. However, the absence of burn lesions usually indicated that the coolant was adequate. Peyton[3] has shown that an air-water spray delivering only 8.5 cc. per minute was adequate to control frictional heat developed from technics employing speeds of from 30,000 to 170,000 rpm.

Assuming that the effects of temperature rise were controlled by coolants since burn lesions were absent, the greater pressures, or forces, induced the increased severity of the inflammatory response. A burn lesion indicates excessive temperature rise. Intense cellular infiltration and cellular displacement, in the absence of a burn lesion, indicate excessive force.

The composition or design of the no. 37 diamond stone was completely cleared as being the cause of excessive pathological alterations in the lower speed technics when the imported turbine was used.

It appears that, if the applied forces are greater than 8 ounces, despite the control of frictional heat, a prominent inflammatory response can be initiated. A load below 8 ounces and preferably no more than 4 ounces appears to be desirable biologically. The combination of minimal load and controlled temperature produces very slight pulpal lesions.

Our findings agree with the statement of Massler,[1] but with some modifications. Heavy pressure, whether or not continuous, even with the use of an adequate coolant, produces more damage than light continuous pressure does.

The method employed in these studies for determining the amount of force applied was coarse. New and more precise electronic equipment, that permits continuous readings of the applied forces during the entire cutting procedure, has been developed. Such instrumentation would provide a more direct and accurate recording of these measurements and should be used in further studies of this kind.

With these findings it will be interesting to evaluate the effects of those restorative procedures which require the application of force in order to insert a filling material into a prepared cavity.

SUMMARY

The purpose of this study was to determine the part applied pressure contributes to the pulpal responses resulting from operative procedures. Since cool-

ants will neutralize the frictional heat created by rotating instruments at all speeds, different levels of intensity of the pulpal inflammatory responses, represented by leukocytic infiltration and cellular displacement, can be recognized on the basis of differences in applied pressures. Coolants, although adequate to prevent burn lesions, do not minimize inflammatory responses when the operative technic requires an applied force above 8 ounces. Thus, it can be assumed that greater pressures increase the severity of the pulpal inflammatory response. Future studies of this nature should employ newly developed electronic equipment that permits continuous readings of the applied pressures during the entire cutting procedure and also provides more accurate recordings of these measurements.

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Race for Survival • Man in his arrogance may boast that the battle is to the strong, that pity and affection are signs of weakness. . . . Man, in the achievement of a unique gift—a thinking brain capable of weighing stars or atoms—cannot grow that brain in the nine months before birth. It is, however, a peculiarly plastic brain, intended to receive impressions from the social world around it. Instinct, unlike the case in the world of animals, is here reduced to a minimum. This brain must grow and learn, be able to profit by experience . . .

Is the price of acquiring brains, brains to look before and after in the universe, only to mean subservience to man after escaping subservience to nature . . . ? Is it to mean acquiescence in the plans of those clever intellects who talk glibly of psychological "break-throughs" and the subliminal control of nations? Is it for this that men have labored up the dark pathway behind us and died often and blindly for some vision they could scarcely see? A society has an image of itself, its way of life. This image is a wavering, composite picture reflected from millions of minds. If the image is largely compounded of the events of the present; if tradition is weak, the past forgotten, that image can alter by subtle degrees. . . . The humane tradition—arts, letters, philosophy, the social sciences—threatens to be ignored as unrealistic in what has become a technological race for survival . . .

Man, unlike the animal, is aware of the nature of his society. His conscious image of it is tremendously important in shaping what it will become. . . . Man, whether he engages in war or not, is in a pyramiding technological society whose values are largely directed outward upon things. The important fact in such a material age is that we do not abandon or forget that man has always sought to transcend himself spiritually, and that this is part of his strange heritage. It is a heritage which must be preserved in our schools and churches, for in a society without deep historical memory, the future ceases to exist and the present becomes a meaningless cacophony. A future worth contemplating will not be achieved solely by flights to the far side of the moon. It will not be found in space. It will be achieved, if it is achieved at all, only in our individual hearts. This is the choice that has been presented man, as a free agent, as one who can look before and after. *L. Eiseley, An Evolutionist Looks at Modern Man. The Saturday Evening Post, April 26, 1959.*

The effect of continuity of residence and drinking water source on caries incidence in Dothan, Alabama

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In 1959, fluoridation of the drinking water supply was instituted in Dothan, Ala., near a fertile agricultural area in which are concentrated most of the communities in Alabama with naturally fluoridated water. A dental health survey, conducted to establish a base line from which to evaluate fluoridation, revealed a difference in DMF rates between children in continuous residence in Dothan and the entire group of children. In establishing a base line from which to evaluate fluoridation, the data should be gathered only from a sample of the population that has been in continuous residence.

In evaluating fluoridation after its use in a communal drinking water supply for a number of years, it makes good sense to restrict the sample of the population screened to those who have been continuously in residence in the community and who have resided since birth in the area served by that particular drinking water system. Determining who qualifies as a continuous resident prior to the actual survey poses an additional, but essential and surmountable, administrative problem.

In theory then, the evaluation of a fluoridation program should proceed by making comparisons between data obtained by screening a selected sample after a stated interval of time and data obtained from a survey of the dental health of a sample conducted at the time fluoridation was begun.

In Grand Rapids, Mich.,[1] fluoridation was evaluated on the strength of observations on children with a record of continuous residence both before fluoridation was instituted and again after a stated number of years of exposure to fluoridated waters.[2]

On the other hand, a survey conducted in Athens, Ga., in March 1957 showed a significant reduction in decay experience of children at each age level, 6 through 12 years, after five years of fluoridation. In the introduction to the report of this study,[3] it was pointed out that the original base line data in this instance were gathered with no regard to screening the sample for continuity of residence. However, the probability of the data being affected by this factor is implied. The question, then, presents itself logically. Is it necessary to restrict

the sample at the time the prefluoridation study is conducted to the same two factors: continuity of residence and source of drinking water?

DOTHAN

The opportunity to find the answer to this question presented itself when, on April 20, 1959, controlled fluoridation of the drinking water supply was instituted in Dothan, the city having first met the requirements for fluoridation as set forth by the Alabama State Department of Public Health.[4]

Dothan is a bustling, progressive city situated in the wire-grass section of southern Alabama, fairly close to a military reservation. To the west of Dothan lies a fertile agricultural area in which most of the communities in Alabama that boast naturally fluoridated water are concentrated.[5] Some 13 communities in this region dispense drinking water from central supplies to approximately 20,000 people, according to the 1950 census. This water contains between 0.7 and 3.2 ppm of natural fluorides. In the country surrounding these small communities are countless farms, each with its own well. If the water in these private wells has ever been analyzed for fluorine content, reports are not available. However, it is likely that they have never been so analyzed. Potentially, however, it is assumed that much of this water does contain natural fluorine in varying concentrations.

The 1950 census[6] revealed a continuing trend of rural families to migrate to urban areas. The general feeling is that this trend is still continuing in Alabama,[7] although definitive statistical data to substantiate this belief will not be available until the report of the 1960 census is published.

The population of Dothan has grown from 21,584 in 1950 to an estimated 32,430 as of midyear 1959. Dothan and its environs are not highly industrialized. Therefore, it is assumed that much of this growth was of a natural type, accounted for by an increased birth rate.[7] Certainly, however, some of this increase in population was caused by the migration of people from nearby in-state areas as well as from out-of-state places. It is conceivable that some of these people may have come from areas where the drinking water is fluoridated, either naturally or controlled.

With the beginning of fluoridation in Dothan, a dental health survey was planned in order to establish a base line from which to evaluate this public health measure in the years to come. Assistance in this undertaking was provided by James F. Lewis, dental consultant, and Fred D. Lewis, Jr., assistant dental consultant, Region IV, United States Public Health Service, Atlanta, Ga.

DENTAL INSPECTIONS

On the strength of the premise that school dental health inspections also serve a motivational and educational purpose,[8] as well as being a fact-finding instrument, it was deemed advisable at the outset to include in the study herein described all the white children enrolled in grades 1 through 6 in the city school system. However, because of the possibility that children who had been reared in fluoridated areas might affect the base line data, classroom teachers were requested to determine for each child, prior to the inspection, whether the child was a continuous resident of Dothan and had lived within the area served by the community drinking water system. It was suggested that, in each instance, the teachers refer to existing school records or contact a parent when the record was not clear. Continuous residence was defined as having been born in Dothan and having resided there continuously since birth without an absence of more than 90 consecutive days.

The afore-mentioned method was

Table 1 • Dental health observations by age for 2,746 white school children,* Dothan, Ala., October 1959

	All ages	Age, last birthday						
		6	7	8	9	10	11	12
Total number of children	2,746	426	475	425	447	441	383	149
Children with permanent teeth	2,672	356	471	425	447	441	383	149
Children with 1 or more DMF teeth	1,977	129	261	335	378	390	346	138
Carious permanent teeth (D)	2,989	188	380	504	485	557	558	317
Filled permanent teeth (F)	3,407	46	209	456	674	806	936	280
Missing Permanent Teeth — extraction indicated (I)	156	1	2	19	23	35	44	32
Missing Permanent Teeth — extracted (E)	273	0	9	10	24	61	88	81
Children with deciduous teeth	1,761	426	475	425	435			
Carious deciduous teeth (d)	4,829	1,347	1,352	1,131	999			
Filled deciduous teeth (f)	3,573	787	1,038	915	853			
Children in need of care	1,840	294	332	319	266	281	248	100

*Data accumulated without regard to continuity of residence

adopted. It permitted the gathering of dental health data for the entire white, school population, grades 1 through 6. It also presented the opportunity to extract therefrom, and to process, the pertinent data relative to continuous residents. A comparison could then be made to determine if restricting the sample to continuous residents would alter the dental base line data.

The dental inspections were done by the author and the Doctors Lewis. The examiners standardized their method of inspection by an oral discussion and a printed set of instructions[9] which defined the criteria for the recognition and recording of findings. A Type 3 dental examination, as specified by the American Dental Association,[10] employing a mouth mirror and sharp explorer under good artificial light, was made of each child.

OBSERVATIONS

Observations were recorded and tabulated. The component parts of the study are presented in Table 1, which includes the data obtained for the entire group of school children in the survey, without regard to continuity of residence. Table 2 shows the observations on those children in the entire group who had a

Table 2 • Dental health observations by age for 1,251 white continuous residents of Dothan, Ala.*

	All ages	Age, last birthday						
		6	7	8	9	10	11	12
Total number of children	1,251	193	209	182	201	213	201	52
Children with permanent teeth	1,251	193	209	182	201	213	201	52
Children with 1 or more DMF teeth	950	74	121	152	174	196	184	49
Carious permanent teeth (D)	1,337	103	172	212	219	236	289	106
Filled permanent teeth (F)	1,766	23	89	235	336	462	506	115
Missing Permanent Teeth — extraction indicated (I)	89	0	0	11	18	15	32	13
Missing Permanent Teeth — extracted (E)	145	0	3	7	11	39	48	37
Children with deciduous teeth	780	193	209	182	196			
Carious deciduous teeth (d)	2,095	565	587	475	468			
Filled deciduous teeth (f)	1,896	380	596	522	398			
Children in need of care	847	134	150	139	127	132	130	35

*Data drawn from findings for 2,746 white school children previously screened for continuity of residence and source of drinking water supply

Table 3 • Effect of continuity of residence on age-specific decay rates for permanent teeth

Age	Entire group			Continuous residents			Differences in decay rates observed when analysis is restricted to continuous residents	
	Number of children	DMF* teeth		Number of children	DMF* teeth			
		Total number	Per child		Total number	Per child	In DMF per child	In per cent
6	356	235	0.66	193	126	0.65	−0.01	−1.5
7	471	600	1.27	209	264	1.26	−0.01	−0.8
8	425	989	2.33	182	465	2.55	+0.22	+9.4
9	447	1,206	2.70	201	584	2.91	+0.21	+7.8
10	441	1,459	3.31	213	752	3.53	+0.22	+6.6
11	383	1,626	4.25	201	875	4.35	+0.10	+2.4
12	149	710	4.77	52	271	5.21	+0.44	+9.2

*Permanent teeth which are either carious, filled, indicated for extraction, or already extracted

history of continuous residence in Dothan and whose homes were being supplied with city water. All children in grades 1 through 6 were screened; but analysis of the data was restricted to ages 6 through 12 years for the permanent dentition and 6 through 9 years for the deciduous dentition. This restriction was considered necessary because of the small number of children ages 13, 14, and 15 years who were still in the elementary grades. It could not be assumed that these children were representative of the entire population at these age levels. With such small numbers of subjects, a slight variation in a number can produce a large variation in a rate or in a percentage.

Analysis of the observations discloses some noticeable differences in the data when converted to percentages. Table 3 reveals that, whereas at ages 6 and 7 years there is little difference in DMF rates, there is a tendency for underevaluation by from 6.6 per cent at age 10 to 9.4 per cent at age 8 when the group is not restricted to continuous residents. At age 11, again there is underevaluation, but only by 2.4 per cent. No attempt is made to offer an explanation of why, at age 11, there is a smaller difference observable between those who have been in continuous residence and the entire group. The important thing to stress is that there is an observed difference in both groups, which could well affect the evaluation of fluoridation. At age 12, failure to restrict the group with regard to residence yields a DMF rate which is 9.2 per cent lower than the rate for those in continuous residence. These differences in DMF rates are depicted graphically in Figure 1.

Because the entire white, elementary school population in Dothan was screened it would be superfluous to test for the statistical significance of the observed differences. Such a test would be indicated only when comparisons are made of the means of the samples.[11] In this instance our samples comprise the entire "universe."

When the decay rates for deciduous teeth are compared, a greater disparity between the continuous residents and the entire group is observed (Table 4). The percentage of change produced by restricting the sample to continuous residents ranges from an overestimation of 2.2 per cent at age 6 to an underestimation of 13.9 per cent at age 8.

A consideration of caries experience rates for both groups discloses a tendency to underevaluate the percentage of children with one or more carious teeth when the group is not screened for continuous residents (Table 5). The amount of this change for each age group is rep-

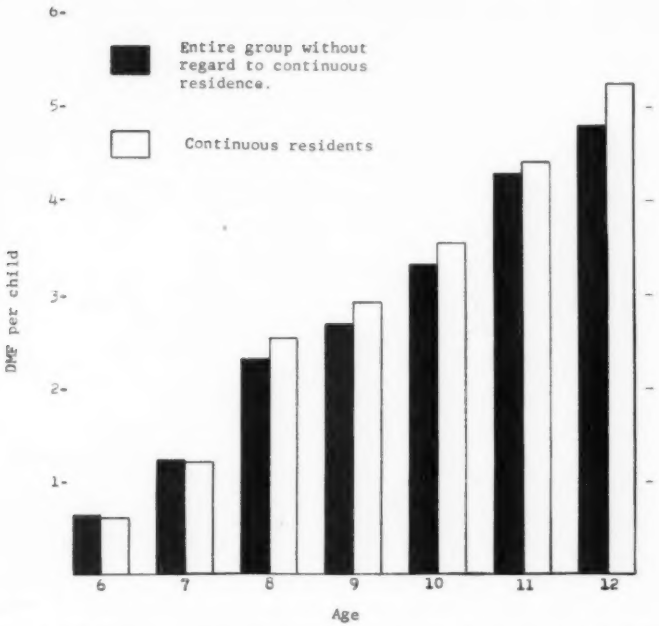

Fig. 1 • Comparative age-specific DMF rates per child for two groups of white children. One group is restricted to continuous residents, the other is drawn from the population at large

resented in Figure 2. Here there is as much as 6.0 per cent underevaluation by not restricting the sample to continuous residence.

Tooth mortality rates between the two groups were also computed and compared. In this instance continuous residence most certainly affects the data, as illustrated in Table 6.

The acceptance of dental treatment is something which can vary from area to area. It reflects such factors as relative educational levels, economic status,[12] availability of dental care, customs, and

Table 4 • Effect of continuity of residence on decay rates for deciduous teeth, Dothan, Ala.

Age	Entire group			Continuous residents			Change in df rates observed when analysis is restricted to continuous residents	
	Number of children	df teeth		Number of children	df teeth		In df per child	In per cent
		Total number	Per child		Total number	Per child		
6	426	2,134	5.01	193	945	4.90	−0.11	−2.2
7	475	2,390	5.03	209	1,183	5.66	+0.53	+10.5
8	425	2,046	4.81	182	997	5.48	+0.67	+13.9
9	435	1,852	4.26	196	866	4.42	+0.16	+3.8

Table 5 • Effect on continuous residence on percentage of children, by age, with one or more DMF permanent teeth,* Dothan, Ala.

Age	Entire group			Continuous residents			Change in caries experience observed when analysis is based on continuous residence	
	Number of children	With at least one DMF tooth		Number of children	With at least one DMF tooth		On caries experience	Per cent of change
		Total number	Per cent		Total number	Per cent		
6	356	129	36.2	193	74	38.3	+2.1	+5.8
7	471	261	55.4	209	121	57.9	+2.5	+4.5
8	425	335	78.8	182	152	83.5	+4.7	+6.0
9	447	378	84.6	201	174	86.6	+2.0	+2.4
10	441	390	88.4	213	196	92.0	+3.6	+4.1
11	383	346	90.3	201	184	91.5	+1.2	+1.3
12	149	138	92.6	52	49	94.2	+1.6	+1.7

*Caries experience

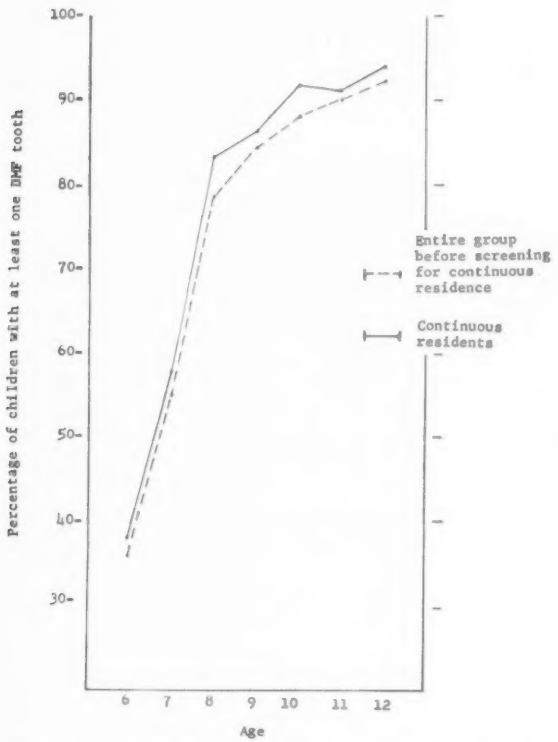

Fig. 2 • The percentage of children with caries experience is affected by continuous residence in a prefluoridation survey

Table 6 • Effect of continuous residence on tooth mortality rates of children age 6 through 12 in Dothan, Ala.

Age	Entire group			Continuous residents			Change produced by continuous residence	
	No. with permanent teeth	Missing permanent teeth		No. with permanent teeth	Missing permanent teeth			
		Total no.	Missing teeth per 100 children		Total no.	Missing teeth per 100 children	Amt.	%
6	356	1	0.3	193	0	0.0	−0.3	−100.0
7	471	11	2.3	209	3	1.4	−0.9	−39.1
8	425	29	6.8	182	18	9.9	+3.1	+45.6
9	447	47	10.5	201	29	14.4	+3.9	+37.1
10	441	96	21.8	213	54	25.4	+3.6	+16.5
11	383	132	34.5	201	80	39.8	+5.3	+15.4
12	149	113	75.8	52	50	96.2	+20.4	+26.9

beliefs, as well as the general state of readiness of a population to accept the treatment. As a matter of fact, the ratio of filled teeth to the total number of DMF teeth in a community can be used as an index for the evaluation of the effectiveness of a program in dental health. The effect of continuous residence on this ratio also was compared (Table 7).

A comparison of the percentage of children in Dothan requiring dental treatment was made between the entire group, age 6 through 12, and those in the group who were continuous residents. The effect of continuous residence on these data is illustrated in Table 8. Here again the findings differ appreciably.

SUMMARY AND CONCLUSIONS

Logic and common sense dictate that, in establishing a base line from which to evaluate fluoridation, the data be gathered from a sample of the population that has been in continuous residence. Therefore, it was determined to measure the effect on dental health findings of restricting the sample in one community to continuous residence. The data and statistics from the study prove that the findings are biased if the sample is not restricted to continuous residents. The need to eliminate as many variables as possible in evaluating a public health procedure, in this instance the effectiveness of fluoridation in inhibiting dental

Table 7 • Effect of continuity of residence on degree of care afforded the permanent teeth of white school children in Dothan, Ala.

Age	Entire group			Continuous residents			Change produced by continuous residence on per cent of DMF teeth filled	
	No. of DMF teeth	Filled permanent teeth		No. of DMF teeth	Filled permanent teeth			
		No.	%		No.	%	Amt.	%
6	235	46	19.6	126	23	18.3	−1.3	−6.6
7	600	209	34.8	264	89	33.7	−1.1	−3.2
8	989	456	46.1	465	235	50.5	+4.4	+9.5
9	1,206	674	55.9	584	336	57.5	+1.6	+2.9
10	1,459	806	55.2	752	462	61.4	+6.2	+11.2
11	1,626	936	57.6	875	506	57.8	+0.2	+0.3
12	710	280	39.4	271	115	42.4	+3.0	+7.6

Table 8 • Effect of continuous residence on percentage of children requiring dental care in Dothan, Ala.

Age	Entire group			Continuous residents			Change produced by continuous residence on per cent of children requiring care	
	Total no. of children	Referred for care		Total no. of children	Referred for care			
		No.	%		No.	%	Amt.	%
6	426	294	69.0	193	134	69.4	+0.4	+0.6
7	475	332	69.9	209	150	71.8	+1.9	+2.7
8	425	319	75.1	182	139	76.4	+1.3	+1.7
9	447	266	59.5	201	127	63.2	+3.7	+6.2
10	441	281	63.7	213	132	62.0	−1.7	−2.7
11	383	248	64.8	201	130	64.7	−0.1	−0.2
12	149	100	67.1	52	35	67.3	+0.2	+0.3

caries, is made evident by the study. The observed difference in the statistics in all instances could conceivably alter the demonstrable effectiveness of fluoridation after it has been in use over a period of years and evaluation is undertaken.

Since the entire "universe" comprised the samples studied in Dothan, tests for significance of the differences between observations in the two groups are not necessary. Furthermore, good judgment and technic make it mandatory to restrict the analysis of data in such a study to continuous residents. Moroney[13] makes this clear when he points out that "common sense cannot possibly be taken care of statistically."

•Director, Bureau of Dental Hygiene, Alabama State Department of Public Health.

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Balance in Education • The nature of the training of the scientist tends rather to disable than to equip him for the conduct of affairs. Conversely, education in (or about) science is not commonly a feature of a business man's background. What is surprising, in the circumstances, is not industry's neglect of scientific opportunities (of which scientists are always complaining) but the use they have made of them. Of course, much science could be much more efficiently used if scientists had more knowledge of business and business men had more knowledge of science. The problem of all business concerns, whether they are based on scientific innovations like atomics, electronics, plastics or fine chemicals, or whether they are traditional industries aiming at modernizing themselves by new scientific techniques, is to know when—and when not—to listen to the scientist. *Ritchie Calder. Optima, September 1958.*

The comminuting efficiency of varied occlusal tooth form and the associated deformation of the complete denture base

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Three different posterior tooth forms were evaluated for chewing efficiency and denture base deformation, in five edentulous subjects with upper and lower complete dentures. The 33 degree posterior teeth caused more compressive and extensive denture base deformation than zero degree French's posterior teeth. The 20 degree posterior teeth caused nearly as much deformation as the 33 degree posterior teeth. The cuspal inclination angle did not appear to alter chewing efficiency significantly. All occlusal tooth forms tested are efficient enough to prepare food boluses for complete digestion. An occlusal tooth form should be judged primarily on its capacity to minimize forces in a horizontal or lateral plane which contribute to the accelerated atrophy of the residual ridge.

The dual need in complete denture prosthodontics of providing efficient chewing and maximal preservation of the residual ridges has focused the attention of practitioners on the design of the occlusal surface of posterior teeth. The existence of three schools of thought has caused three differing occlusal forms to be in common use. These occlusal forms are classified as (1) the anatomic or cuspated tooth which is represented by the 33 degree cusped posterior tooth; (2) the nonanatomic or noncuspated tooth represented by the Hardy, French's or Hall's posterior teeth and (3) a compromise form of the preceding two widely variant forms which is represented by the 20 degree teeth and the Tuller-Fournett posterior teeth.

The specific aim of this project was to investigate the effect of varied occlusal tooth forms on (1) the comminuting efficiency, and (2) the horizontal deformation of complete denture bases in vivo.

The terms "anatomic" and "nonanatomic" as related to tooth occlusal form are defined as follows: an anatomic tooth is one whose occlusal surface is carved to imitate the unworn natural teeth; the occlusal surface of such teeth has cusps and inclined planes which cause the upper and lower teeth to interdigitate in a specific manner. A nonanatomic tooth is one not resembling the natural tooth; its occlusal surface is designed on a mechanical rather than an anatomic basis yielding no definite geared

interdigitation. Sears[1] lists several specifications further clarifying the definition of nonanatomic teeth:

1. The working occlusal surface should be void of cusps or inclined planes that hinder the free horizontal gliding of opposing surfaces as the alveolar ridges resorb or as the mandible carries the teeth into protrusive occlusion.

2. The working occlusal surfaces should have no inclined planes that might hinder the free horizontal gliding of opposing surfaces as the mandible carries the teeth laterally.

Many tests in the last quarter century have been conducted to determine the comminuting efficiency of various designs of occlusal surfaces. Manly and Vinton[2] in a cross study of patients with complete dentures showed that there was no difference between the performance of 50 persons using nonanatomic porcelain teeth and 29 persons using anatomic porcelain teeth.

Trapozzano and Lazzari[3] reported data supporting the view that 20 degree posterior teeth were more efficient than Hall's and DeVan's nonanatomic tooth forms. Sobolik[4] after personally testing five types of artificial posterior teeth in his own mouth reported that three of these tooth forms complied with Sear's definition of the nonanatomic tooth form. He also stated that no one form was superior with all foods, although he implied that the French's and Tru-Kusp tooth forms appeared to give uniformly better performance than did Hall's inverted cusp tooth form. Thompson[5] found in a test series that 33 degree anatomic teeth were 65 per cent efficient, 20 degree posterior teeth were 57 per cent efficient and Hall's inverted cusp teeth were 56 per cent efficient.

Payne,[6] who tested one subject with both anatomic and nonanatomic teeth on duplicate denture bases, concluded that 33 degree anatomic teeth were more efficient in comminution than were the flat, nonanatomic teeth. Schultz[7] and Schuyler[8] have also investigated occlusal tooth form in relation to comminuting efficiency and have indicated that the anatomic tooth form is more efficient than the nonanatomic form. Trapozzano[9] in a series of eight subjects found that they preferred the 20 degree posterior teeth to the nonanatomic Hall's posteriors. From these findings, it is apparent that further work must be done to understand the role of comminuting efficiency in artificial occlusal tooth forms.

Atrophy and resorption of the residual ridge is of great concern to prosthodontists. Therefore, it is considered imperative to reduce to a minimum the horizontal component of functional forces which supposedly cause alveolar ridge changes. The proponents of nonanatomic teeth claim that the cusp tooth form delivers a maximum horizontal component of functional forces which tends to destroy the alveolar ridges and dislodge the dentures. They maintain that these horizontal forces can be eliminated by merely removing the cusps that generate them.

In contrast, Schuyler[8] maintains that it is the inclination of eminentia articularis and the incisal guidance, and not the tooth form, which governs the resultant characteristics of applied forces. From this it may be concluded that variation in the tooth's occlusal form has no influence on the direction of the resultant components of applied forces. The magnitude of the horizontal component of force or denture deformation contributed by various occlusal tooth forms *in situ* has been reported using one subject.[10]

METHODS AND MATERIALS

The test subjects were edentulous and were familiar with the use of artificial dentures. The subjects were three males and two females.

Five complete upper and lower test dentures were made of acrylic resin, and each carried porcelain posterior teeth

with a selected degree of cuspal angulation. The construction technic included a compound eugenol paste wash impression and the use of a central bearing point extraoral tracing device for determining centric and eccentric positions of the mandible. Plaster check-bites were used for registering the condylar path values. The teeth were set in bilateral balance on a House articulator whose controls were set by plaster interocclusal records.

A sagittal incisal guidance of 10 degrees and a lateral incisal guidance of 20 degrees were utilized in the testing program, so that the 33 degree posterior teeth would not suffer undue cuspal incline reduction. It was considered imperative to use the same incisal guidance in all test dentures regardless of the variation in occlusal tooth form used.

The test foods selected were salted peanuts and raw carrots, which provide a wide range in physical properties. Both foods were used because Yurkstas and Manly[11] have shown that denture wearers do not give related performances characterizing masticatory function with either soft or tough food.

Modification of Test Dentures • The test dentures were modified only to the extent of changing the type of posterior teeth. The sequence of tooth forms used was 33 degrees, 20 degrees, and French's posterior as zero degree teeth.

To insure that no positional change was inadvertently incorporated in changing the posterior teeth, a series of matrixes was constructed at the completion of the machine paste milling. The matrix was made to include the occlusal surface of the posterior teeth and the buccal flanges of the denture. Thus, after testing, each denture could be returned to the articulator independently in exactly the same relationship as had existed at the time of the complete mill-in.

After a test series had been completed, the dentures were repositioned on the articulator, and the posterior teeth were removed and replaced with the next tooth form to be used. The teeth to be substituted were imbedded in the matrix and reattached to the acrylic resin base with self-curing methyl methacrylate. To check the validity of the testing procedure, the original 33 degree posterior teeth were remounted on the denture. A comminuting test was then executed with the same test foods, and the recordings revealed approximately the same values as were made originally with these 33 degree posterior teeth; consequently, it was assumed that the test results were valid and unaffected by the denture fabricating procedures (Fig. 1).

Instrumentation • The electronic measuring equipment used is similar to that used in previous reports[10] and is essentially a Wheatstone bridge utilizing Baldwin Sr-4 strain gauges. These gauges are attached to the lingual side of the lower denture base near the midline, and one gauge was placed directly superior to the other. With this gauge placement, measurement was taken of (1) compression of the denture in a horizontal plane or the moving together of its wings toward the midline; and (2) extension of the denture in a horizontal plane or the spreading apart of its wings or their moving away from the midline. Such a placement of the gauges made possible the detection of torsional rotation within the denture base. However, it is not within the scope of this report to measure the amount of torsion; therefore, it will be considered from a qualitative point of view only, as any significant degree of torsion could distort the validity of the horizontal force recordings.

Evaluation of Comminuting Performance • In this evaluation the efficiency of comminution was judged by sieve analysis of chewed food.

Nine grams of a test food was weighed and divided into 3 Gm. portions and

Fig. 1 • Test dentures mounted on articulator with strain gauges in position.

presented to a subject for chewing. The subject was instructed to chew the food for 20 masticatory strokes, and no other instructions were given. The chewed food was expectorated into a beaker, the mouth rinsed with water and the rinsings added to the beaker. This procedure was repeated for a second and third portion of the food. The contents of the beaker were stirred vigorously with a stirring rod to break up lumps of food and then poured onto a no. 4 mesh screen and washed with 300 cc. of water. The contents remaining on the no. 4 mesh screen were shaken off onto a filter paper and weighed. The same procedure was carried out for subsequent screens which were no. 10, 20, and 80 in the U. S. standard sieve series. This chewing procedure was carried out twice on each subject with each tooth form.

RESULTS

Chewing Efficiency • The statistical analysis of the data for the five subjects was handled separately for the two diets (peanuts, carrots) by means of the "analysis of variance" technic (extension of the "t" test for comparing two or more population means). In Figure 2 (carrots), it will be noted that there are highly significant differences among the average per cent retention for the patients for each screen mesh. Only for the no. 4 and 10 meshed screens did the angle of cuspal inclination appear to be a significant factor. In Figure 3 (peanuts) only at the no. 4 meshed screen level did a significant difference appear.

These data on average percentage values are plotted in Figures 2 and 3, and the results generally reflect the conclusion mentioned previously; namely, that in this study the cuspal inclination angle did not generally appear to alter chewing efficiency significantly.

Denture Base Deformation • More denture base deformation occurred when the subjects were chewing with the 33 degree and 20 degree posterior teeth. Extension was 33 per cent greater with these teeth than with the zero degree French's posterior teeth. Compressive denture base deformation was 68 per cent more with 20 degree posterior teeth and 100 per cent greater with 33 degree

posterior teeth than with the zero degree French's posterior teeth. Maximal deformation was 2.5 mm. in compression and 2.0 mm. in extension (Fig. 4 and 5).

DISCUSSION

It might be postulated that during near contact of the dentition with a food bolus interposed, the occlusal contact area of the teeth for a given subject might be related to the deformation in the denture base. It would appear that the four posterior teeth of the French's type have less occlusal area than the Trubyte 20 degree or 33 degree posterior teeth. This would infer that there is a force per unit area relationship between the three posterior tooth forms used. This force per unit area relationship has been illustrated in vitro.[12]

It has been stated that the tooth form which occurs naturally should be used. Because something occurs naturally, however, does not mean that it is good or bad. Bacterial pathogens occur naturally but they do not benefit man. Also, the cusped tooth is analogous to the recently erupted, unworn tooth. However, the noncusp form is analogous to the teeth which occur naturally in the mouth of many adults 40 years of age and older. Which tooth form is "natural" for the artificial denture patient?

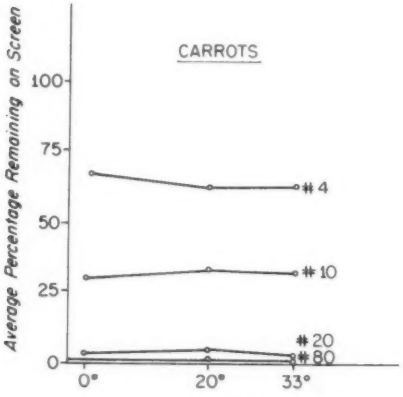

Fig. 2 • Ordinate indicates percentage of carrots remaining on screen. Vertical column of figures at right shows screen mesh size. Abscissa indicates tooth form used

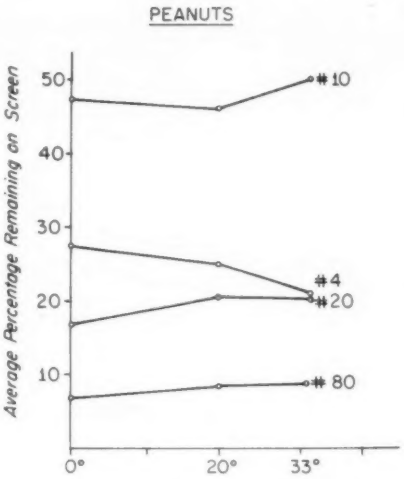

Fig. 3 • Ordinate indicates percentage of peanuts remaining on screen. Vertical column of figures at right shows screen mesh size. Abscissa indicates tooth form used

When occlusal efficiency is considered, the primary concern is with the adequate preparation of food for complete digestion. Farrell,[13, 14] in a study on the effect of swallowing encapsulated, unchewed boluses of food, found that many foods needed no chewing to be completely digested—meat fat, all forms of fish, hard-boiled eggs, bread and cheese. Foods such as lean meats and vegetables needed some chewing. The amount of chewing necessary for complete digestion of the least digestible lean meat (fried pork) was found to be rather small. The test subject chewed the boluses with a full complement of posterior teeth. The same subject again chewed a duplicate bolus using only the upper and lower incisors. The subject was able to digest both boluses of food completely. The chewing

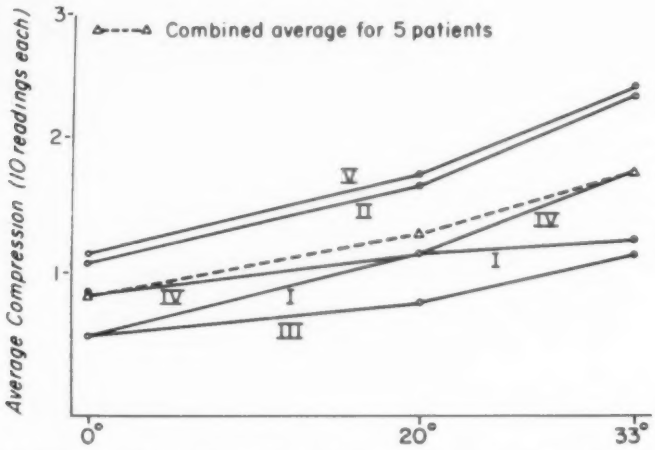

Fig. 4 • Ordinate shows average compression for each tooth form in millimeters. Average is based on ten successive readings for each tooth form for each denture. Abscissa indicates type of posterior tooth

efficiency using the peanut test was 89 per cent for the full complement of teeth and 23 per cent when the upper and lower incisors were used only. A series of subjects with complete artificial dentures could comminute test foods as well as any of the nine other subjects who were chewing with natural dentitions.

On the basis of Farrell's excellent work, it appears that dentists concern themselves excessively with small percentage changes in chewing efficiency. All occlusal tooth forms tested to date would fall within the 23 to 89 per cent range of efficiency as being adequate for preparation of the food boluses for complete digestion.

It would seem that forces that supposedly contribute to the accelerated atrophy of the residual ridge, that is, forces in a horizontal or lateral plane, should be the primary concern. What can be done to minimize these horizontal forces whether they occur as a lateral shift of the denture base in its entirety or as a deformation of the denture base? From this point of view occlusal tooth form is important. In addition, deformation of the denture bases during comminution makes the dentures dislodge more easily; this effect has clinical significance. It appears that the most desirable denture base material to resist deformation would be one with a high modulus of elasticity such as a metal; an alternative might be to make the resin denture base thicker.

SUMMARY

Three different posterior tooth forms were evaluated for chewing efficiency and denture base deformation, in five edentulous subjects with upper and lower complete dentures. The 33 degree posterior teeth caused more compressive and extensive denture base deformation than zero degree French's posterior teeth. The 20 degree posterior teeth caused nearly as much deformation as the 33 degree posterior teeth.

The cuspal inclination angle did not appear to alter chewing efficiency significantly in this study.

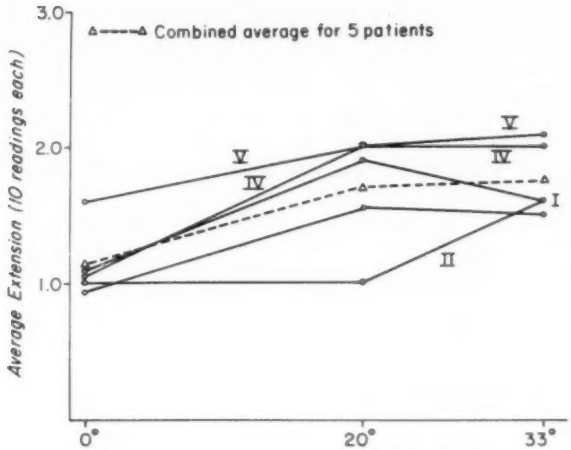

Fig. 5 • Ordinate shows average extension for each tooth form in millimeters. Average based on ten successive readings for each tooth form for each denture. Abscissa shows type of tooth

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World Income • In 1950, world per capita income was estimated at $223. In North America, per capita income was $1100. Had each person on the globe enjoyed the North American level of living in 1950, as measured by per capita income, the aggregate world product in 1950 would have supported only 500 million persons, as contrasted with the actual world population of 2.5 billion. For average world income to have matched income in North America, aggregate income would have had to be increased about fivefold. To bring world per capita income by 1975 to the level enjoyed in North America in 1950 would require about a 7.5-fold increase of the 1950 level in 25 years. To do the same by 2000 would require a 12-fold increase in the 1950 world income within 50 years. *Philip M. Hauser. Demographic Dimensions of World Politics. Science 131:1642 June 3, 1960.*

Detection and recognition of bruxism

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***Bruxism** is a nonfunctional, voluntary or involuntary, mandibular movement which may occur during the day or night. It is manifested by occasional or habitual grinding, clenching or clicking of the teeth. Causes of bruxism may be local, systemic, psychological and occupational. A technic to detect bruxism is based on a lengthy questionnaire, a case history and clinical examination. Because of the high incidence of bruxism, it should be suspected in all instances of periodontal disease. It is the dentist's responsibility to recognize and detect bruxism, evaluate its effects, and treat and eliminate it when it is destructive.*

Mounting interest in bruxism is being shown by the dentist, the physician, and the patient. However, interest alone is not enough. Bruxism affects a large percentage of the population. The dentist is not fulfilling his responsibility to his patients if the destructive effects of bruxism are permitted to take place in instances which he had not even diagnosed as bruxism. A technic to detect and recognize these instances will be proposed in this article.

Bruxism should be defined, its causes established, its effects recognized, and it should be treated and eliminated when destructive. Help for the individual with bruxism lies in its detection and recognition.

The detection and recognition of bruxism is both an art and a science. Detection requires persistence, a careful evaluation of differential factors and, at times, tact and diplomacy. The dentist may be probing for information which the patient finds difficult to disclose, or of which he may be totally unaware. Such a variety of interpretations and meanings concerning bruxism exists that it has become confusing. Therefore, in the detection of bruxism, it is important that a comprehensive description and a clear definition be drawn.

DESCRIPTION

Bruxism, the habitual grinding, clenching or clicking of the teeth, is a perversion of mastication, the primary purpose of the dentition. It is manifested by contact of the morsal surfaces of the teeth. Bruxism is a mandibular movement originating from the physiologic rest position, or from centric occlusion, to a contact position which may be momentarily maintained or continued into a modification of the original contact. It may be voluntary or involuntary and may occur during the day, the night or both.

There are two variations of the grinding habit: (1) the clenching habit in which pressures are brought upon the

periodontal structures by the repeated clamping of the teeth, and (2) the clicking habit, which is usually a rapid, repeated, rhythmic tapping of the teeth.

Bruxism is manifested by grinding, clenching and clicking of the teeth at times other than during their functional use. Except for contact during mastication, occasional light contact during speech, and possible contact at the completion of swallowing, sneezing, coughing and yawning, other forms of pressure contact may be considered acts of bruxism. Bruxism is not always a single activity but may, at times, be performed as a combination movement. Thus there may be a form of bruxism which is not purely a grinding or clenching act but a combination of both. Bruxism may occur at any age and is almost universal in its incidence. The degree varies with each individual.

There are many causes of bruxism. In an earlier study by the author,[1] the causes of bruxism were indicated in detail. They may be divided into the following classes: local, systemic, psychological and occupational. However, under this classification, a cause may move from one class to another, such as from occupational to psychological.

CASE HISTORY

The usual information is noted when taking the patient's case history: name, date, occupation, sex, age, birthplace, marital status, and number of children. Questions should be asked to complete the patient's medical history. A tentative psychological estimate can be made by proper questioning. Information concerning the nature of the patient's occupation, with the thought that people undergoing physical, emotional or mental stress are more apt to develop bruxism, can be valuable.

The case history may disclose systemic, psychological and occupational factors which cause bruxism.

Systemic Factors • The medical background may be highly significant. A variety of systemic factors may be pertinent. Gastrointestinal disturbances, nutritional deficiencies, nephritis, allergies, sinusitis, vesical irritabilities, neurological and neuromuscular disturbances, endocrine disorders and hereditary factors should be considered.

Patients suffering from neuropathologic diseases often present obvious bruxism habits which are, in some cases, spastic and are part of the general symptomatology. Epilepsy, meningitis, chorea, cerebral spastic infantile paralysis, and cerebral palsy may also be causative factors.[2,3]

Psychological Factors • A history of severe anxiety, nervousness and prolonged tension may be significant. Psychiatric observations and diagnoses may be valuable. It has been demonstrated that inmates of mental institutions have a high per cent of bruxism.[4] Psychologists and psychiatrists report that some patients undergoing psychoanalysis mention acts of bruxism.

Occupational Factors • The occupation of the patient may also be significant. It should be determined if the nature of the occupation is conducive to bruxism. Bruxism affords relief from the complexities of problems facing some individuals, not only in their occupation, but also from the stresses of modern living.[1]

Acids, sand, granite, gravel, and other abrasive materials may enter the oral cavity and produce etching or abrasion of the teeth which resemble the effects of bruxism.

Present Complaint • The patient may report bleeding of the gums, particularly on awakening, associated with bruxism during the night. He may report a feeling of tooth consciousness, looseness of his teeth, tightness of his teeth and that he finds on awakening that his jaws are

locked together. He may complain of pain emanating from a particular tooth or several teeth or of temporomandibular joint symptoms and he may have trismus. Also, he may be aware of sharp incisal edges which are cutting his tongue or lips.

QUESTIONNAIRE

A questionnaire should be given the patient at his initial visit. Valuable subjective information concerning the presence of bruxism and other concomitant habits may be disclosed. These concomitant habits are important because they may produce similar effects and often augment the destructive effects of bruxism. The questions listed below are sample questions and, if the examiner elicits positive information, additional corroborative information can be sought to pinpoint the activity of the patient. Some of these questions will serve to bring the habit, if it exists, into sharper focus.

Local factors that can be included in the questionnaire are:

1. Do you grind, clench or click your teeth during the day or night?
2. Do you awake with your jaws clenched?
3. Do your jaws feel tired when you awaken?
4. Do you awake with a feeling of tooth consciousness?
5. Do you notice any bleeding when you awaken?
6. Do your jaws ever "get out of joint"?
7. Do you have pain when opening or closing your mouth?
8. Do your jaws ever click or lock?
9. Do you ever have pain in front of your ears?
10. Do you have teeth that feel high or long? If yes, do you try to wear them down?
11. Do your jaws feel tired at the end of the day?
12. Do you grind, clench or click your teeth during sleep? Has anyone said that you do?
13. Do your teeth ever feel loose?
14. Do you think your teeth are moving or drifting?
15. Are you wearing dentures or removable bridges? If yes, are they comfortable? Are they loose?

Systemic and psychological factors which should be considered when diagnosing bruxism and may be included in the questionnaire are:

1. Do you have frequent headaches?
2. Do you suffer from constipation?
3. Have you ever noticed a twitching in any part of your body?
4. Do your muscles and joints often feel stiff?
5. Did your parents grind, clench or click their teeth?
6. Do you smoke more than one pack of cigarettes per day?
7. Do you drink more than six cups of coffee or tea per day?
8. Do you eat at regular hours? If no, explain.
9. Do you take vitamins?
10. Do you grind, clench or click your teeth when you are nervous? When angry?

The occupational factors which may be included in the questionnaire are:

1. What type of work do you do?
2. Does your work make you nervous or tense?
3. What type of work have you done in the past?
4. Do you do any work with sand or gravel? Any masonry?
5. Do you work with acids?

The concomitant factors which are important in the diagnosis of bruxism and may be included in the questionnaire are:

1. Do you chew gum? If yes, for how long? How many hours per day?
2. Do you smoke cigars? If yes, do you clench them?
3. Do you smoke a pipe? If yes, for how long? How many hours per day? Do you support the pipe with your fingers?
4. Do you bite your fingernails?
5. Are you in the habit of biting any foreign objects such as bobby pins, pencils, toothpicks, and so on? Elaborate.
6. Do you have any difficulty in swallowing? If yes, explain.
7. Do you use many citrus fruits such as lemons or oranges in your diet?
8. Do you chew tobacco? If yes, for how long? How many hours per day?

9. Are you aware of a habit such as pushing your tongue against your teeth? Or biting your lip?

CLINICAL EXAMINATION

In clinical examination, on occasion, certain signs of bruxism are observed. Usually there is little visible. However, at times a visible contraction of the musculature may be noted. The intermittent bulging of the temporal and masseter muscles may be observed, as well as a slight but continued movement of the mandible.[5] Darwin[6] observed visible acts of clenching in the angry man and, in a man suffering the agony of pain, "the mouth may be closely compressed, or more commonly, the lips are retracted, with the teeth clenched or ground together." Except for clenching, some of these acts may be audible and may be reported by someone who sleeps in the same room as the nocturnal "bruxer."

A careful examination of the oral tissues that might be affected by bruxism should be performed with emphasis placed on the following:

Soft Tissues and Musculature • Attrition due to bruxism may give rise to sharp knifelike incisal edges in which traumatization of the lips, cheeks and tongue may also be effected, even to the extent of producing significant pathologic changes. Hypertonicity of the musculature caused by constant activity of the musculature in severe bruxism, may be of diagnostic value.

Gingiva • Recession, bleeding of the gums and inflammation of gingival tissues may be looked for.

Teeth • Abnormal wear on selective teeth or the entire dentition should be looked for. The presence of malocclusion, traumatic occlusion, tilted or missing teeth, sharp incisal edges, overhanging fillings and other faulty dental work should be noted and evaluated in relation to bruxism. The presence of calculus, and sensitive root surfaces also should be noted.

Mobility • Mobility may be caused by traumatic occlusion, periodontal disease or some destructive habit, such as bruxism. The mobility of the entire dentition should be checked. An attempt should be made to account for the mobility of each tooth. This information may be correlated with the subsequent examination of the roentgenograms.

Type of Occlusion • The presence of unilateral mastication, nonocclusion, and hyperocclusion should be noted, as well as the presence of any bite discrepancies or faulty occlusion. The presence of a deep overbite or a locked bite should also be noted and a loss of vertical dimension and alteration of the freeway space should be looked for.

Prosthesis • Removable dentures may contribute to bruxism. Some patients have the feeling that their denture is dropping, so they clench their teeth to overcome this sensation. Ill-fitting dentures may contribute even more.

When bruxism is severe, abutment teeth may be loosened, and castings may be dislodged, particularly if they are thin. In removable prosthesis, underlying tissues may be traumatized and abutment teeth subject to undue stress. Artificial teeth have shown signs of wear and, in severe cases, have broken.

Swallowing • If the swallowing habits of the patient are abnormal, they may contribute to bruxism. If repeated enough these abnormal habits may destroy tissue by improper pressure, and thus swallowing becomes a conjunctive process to bruxism.

Periodontal Disease • Signs of periodontal disease may be noted in the examination. Pressure habits, and bruxism in

particular, may be contributing factors to periodontal disease.

PHYSIOLOGIC REST POSITION AND VARIOUS TYPES OF BRUXISM

In some instances the patient may, at his initial visit, disclose information concerning his bruxism. The physiologic rest position can be demonstrated to him at the initial visit. He may be told that, except for mastication, occasional light contact during speech and possible contact at the completion of swallowing, sneezing, coughing and yawning, other forms of pressure contact of the teeth should be considered acts of bruxism. It should be demonstrated to the patient that the teeth are normally held apart. Any pressure contact that the patient may make, except for the afore-mentioned, should be reported at the next visit. Some patients think that keeping their teeth together is the norm.

The three types of bruxism, grinding, clenching and clicking, may be demonstrated by employing a modified Leof[7] method. The patient should be told that the bruxism habit may be present but he may be unaware of it. His interest and cooperation can be obtained if a demonstration of how a destructive force may be operating is indicated to him clinically, with the aid of the study casts and the roentgenograms.

Often the answer to the direct question, "Do you grind, clench or click your teeth?" will be negative at the initial visit. This is not surprising. If the bruxism is of long duration, it is performed unconsciously. Often repeated acts become habits and as such are performed at an unconscious level. It is the dentist's concern to bring this habit to the consciousness of the patient.

The patient will need time to become aware of his particular habit. His visits should be spaced a few days apart. Before he is dismissed at the initial visit, he should be asked to demonstrate the physiologic rest position, and again be told this is the norm, that the teeth are normally kept apart, not in contact.

Self observation by the patient of any pressure contacts of his teeth will gradually bring to his consciousness the presence of his bruxism. He may report that he associates his habit with some emotion, occupation, or mental activity. He may also report that it occurs during the day, the night, or both.

For corroboration, and to explore the possibility that he may have a nocturnal habit, the patient should be asked whether he sleeps in a room with others. Has his bruxism been audible during the day or night? To whom? Subsequently, after the patient becomes fully aware of his habit, it is important that he give a demonstration of it. Some people who have only nocturnal bruxism find it difficult to give such a demonstration. This happens because the habit is performed unconsciously during sleep and is difficult to perform at a conscious level.

Valuable information results when the patient demonstrates his particular habit. The manner in which he performs his bruxism should be observed carefully and the type, grinding, clenching, clicking or a combination movement, noted. The nature, intensity and direction of force may then be evaluated. This information should be correlated with the destructive effects noted in the roentgenograms and study casts and with the mobility of the patient's teeth.

STUDY CASTS

The nature and type of occlusion and the manifestation of wear on the occlusion may be highly significant. The individualized movements that result from the particular grinding habit of each patient, at times, causes attrition on a few teeth, rather than generalized attrition.

Discrepancies in the occlusion may be seen on the study casts. Occlusal interference, interlocking cusps and the locked

bite are anatomical considerations that may initiate the bruxism.

It has been observed[8] that as a result of wear a curve is gradually brought about in the natural dentition and a plane of wear is established. Variations from this phenomenon of attrition lead to the suspicion of occlusal dysfunction and the possibility of bruxism.

Attrition and attrition in bruxism have been discussed in detail by various writers.[2,5,9-16] Because there is little in the present-day diet that produces serious abrasive effects, excessive wear cannot be explained in terms of normal mastication. Wear may be simulated by the selective grinding of the dentist, biting of a pipe or other foreign objects, and by the excessive mastication of food or the chewing of very hard foods. Excessive gum and tobacco chewing should also be considered.

Wear must also be considered in terms of the type of occlusion, the chronologic age and physiologic requirements of each patient. If, for example, the patient has prematurely lost the posterior teeth and wear is manifested on the incisal edges of the lower anterior teeth and the lingual surfaces of the upper anterior teeth, this amount of wear is not necessarily due to the effects of bruxism. Perhaps the demand made on these teeth in their performance of mastication is the cause. Thus it is important to distinguish between normal wear and bruxism wear.

The following factors, which will aid in the detection of bruxism, may be seen on the study casts:

Attrition on selective surfaces of the teeth or on the entire dentition.

Variation from the normal curve of wear.

Highly-polished facets on slopes of cusps and matching facets.

Ridges between facets and grooves.

Well-defined paths of wear.

Ledges or grooves on the lingual surfaces of maxillary anterior teeth or thinning out of the labiolingual dimension.

Sharp and jagged incisal edges on anterior teeth.

Consistent wear on the mesial slopes of the maxillary teeth might indicate an anterior displacement of the mandible or a protrusive bruxism habit.

Scooping out of the incisal aspects of the anterior teeth.

Loss of vertical height of the clinical crown.

Spacing between teeth caused by excessive wear.

Flattening of inclines, obliteration of cusps and facets, and flattening of the teeth.

Presence of interlocking cusps or a locked bite.

EXAMINATION OF ROENTGENOGRAMS

Bruxism is not always destructive to the alveolar bone. When a balanced bite and uniform wearing of the dentition are produced, and the underlying forces of the dentition fall within the health tolerance of the alveolar bone matrix, a building up process may occur. This is an oversimplification of a complex question. Why is it a building up process for one and a breaking down process for another? Certainly there are many factors at work, including the nature of the bite, the particular type of bruxism (its duration, frequency, intensity and direction of force), possibly some inherent bone factor, and the inherited, systemic and emotional background. For some, bruxism seems to be stimulating just as good exercise might be to the musculature and general well-being of an individual.

Examination of the roentgenograms as a means of diagnosis in the detection of bruxism may be significant. It is important to establish the generalized picture of alveolar bone support and whether the bone is dense, average or diffuse. Where bone destruction has taken place on selective teeth, a local periodontal situation, a traumatogenic occlusion, the aging process or bruxism may be con-

sidered. Where bone is lost, careful checking with the study casts about the position of a particular tooth or teeth in relation to other teeth within the arch and the particular morphology, noting incline planes of the cusps, possibility of locking of the cusps, paths of wear, and so forth, give the dentist valuable information.

Where a selective destruction of alveolar bone is observed, bruxism should be suspected. As a result of bruxism, periodontal damage may take place[12,17,18] and it can be observed roentgenographically. The periodontal space widens and the ultimate result may be increased mobility. Loss of alveolar bone adjacent to second molars for example, should elicit suspicion of an interceptive contact from an adopted centric position, interference on the balancing bite, or more commonly, clenching of the teeth.[19]

Where there is a generalized loss of bone, as occurs in periodontosis, Tenenbaum, and others[20,21] have stated that periodontosis occurs during adolescence and early maturity, and that no single common systemic factor is involved. When little wear and pronounced alveolar destruction is noted in the roentgenogram it is suggested that an early pernicious habit, such as clenching, be considered. Initiation of bruxism at an early age might result in traumatogenic effects which could conceivably produce pronounced alveolar destruction so characteristic of this disease. However, clinical research is necessary to authenticate this.

In instances of excessive wear, the presence of secondary dentin may be noted in the roentgenogram.[5,11]

SUMMARY AND CONCLUSION

1. Bruxism is a nonfunctional mandibular movement either voluntary or involuntary. It may occur during the day, the night or both, and is manifested by the occasional, or habitual, grinding, clenching or clicking of the teeth.

2. Except for mastication, occasional light contact during speech and possible contact at the completion of swallowing, sneezing, coughing and yawning, other forms of pressure contact of the teeth should be considered acts of bruxism.

3. There are a great variety of acts of bruxism. Causes may vary. Acts of bruxism vary with the individual in type, frequency, duration, intensity and direction of force. Some individuals have more than one type of bruxism activity.

4. Bruxism, divided for purposes of classification into grinding, clenching and clicking, often is not a single activity but a combination movement, such as grinding with a clenching component.

5. Because of the high incidence of bruxism, it should be suspected in all instances of periodontal disease.

6. Bruxism should be suspected when severe wear is present and an unaccountable loss of alveolar bone is manifest. It should also be suspected in patients where selective destruction of bone is observed roentgenographically.

7. All bruxistic acts are not destructive.

8. Since bruxism is almost a universal habit and its effects may be harmful, there should be more information made avaliable to the public. The profession should be more aware of this habit, and dental colleges should devote more time to the teaching and research of this phase of dentistry.

9. It is the responsibility of the dentist to recognize and detect bruxism, evaluate its effects and treat and eliminate it when it is destructive.

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The dowel crown

Claude R. Baker, D.D.S., Kansas City, Mo.*

Around 1920 the theory of focal infection and the inadequacy of root canal therapy placed in disrepute the dowel crown. With recent advances in endodontic therapy, increased professional use of the dowel crown is probable, because the dowel crown has proved a most useful unit tooth substitution or fixed partial denture retainer. The dowel crown utilizes the same principle in mechanical retentive design as does the natural tooth in the alveolus. Steps in tooth preparation for the dowel crown, and construction of the crown, are set forth.

A dowel crown might be defined as a dental coronal substitution that gains its primary retention by means of fixed adaptation to a metal post or dowel inserted into a prepared root canal for a predetermined portion of its length. Any partial or complete veneer crown can be designed in this manner. The basic engineering principle in the fundamental design allows for sufficient retention to meet most clinical requirements when a dowel crown is indicated, either as an individual unit restoration or as a bridge retainer. By comparison, this crown type provides superior mechanical retention over the crown types which are adapted to completely vital teeth.

A natural tooth can be considered as being doweled or posted into the alveolus by means of its root and bonded therein by the periodontium. The biomechanics demonstrated by nature to maintain a natural tooth crown on a selected root form is copied in principle by man when he provides an artificial crown substitute on a dowel.

Historically, dowel crown types played an important role at the turn of this

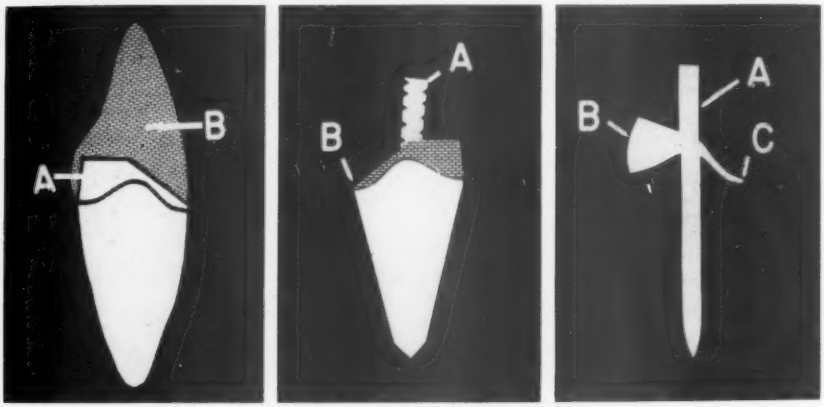


Fig. 1 • Left: A: Lateral view of general form of tooth prepared area. B: Area of natural tooth crown reduction. Center: Metal die counterpart of tooth preparation with dowel seated in position. A: Dowel extends 3 to 4 mm. out of preparation. B: Labial or buccal gingival extent of preparation is reduced beneath height of free gingiva. Right: Metallic core T frame design for dowel crowns. A: Dowel. B: Horizontal cast washer fill-in between prepared root form and tooth-colored crown material. C: Minimal use of metal at labiogingival aspect

century and until about 1920. Root canal therapy at this period was inadequate and it had a far-reaching effect. The theory of focal infection, which was more or less sponsored by high medical opinion at the time, was accepted. Those teeth that had been rendered "nonvital" were publicized as being responsible for many of the common diseases of civilized man.

Feelings rose and the pendulum swung the full distance. Because the dowel crown is adapted to "nonvital" natural teeth, and because the dentists who did a considerable amount of crown and bridge dentistry during that period frequently utilized this procedure, this type of prosthesis fell into general disrepute. Reasonably good sense or even fair judgment played little part in the evaluation of these treatments and all were condemned as bad. The human practice of placing the blame in the wrong place operated to put the cause for failure on the crown type, not on the canal treatment where the specific cause for failure was located. The development of a sound set of clinical values took the better part of the next 30 years.

The fact that the clinical application of the principle of a dowel crown is considered today as an accepted healthful prosthodontic treatment is due to the fact that the modern science of endodontics has developed proved health treatment practices. There is little reference pertinent to construction technics for dowel crowns in modern dental literature to add to procedures described three decades ago. One tooth-colored material in particular, acrylic resin, was unknown at the time when the names for dowel crown types such as Richmond and Davis were commonplace.

Projecting a satisfactory physical design into a prosthodontic device requires the existence of qualified materials that have been proved clinically as meeting the requirements. Available materials are one major limiting factor. The factor of greatest importance is the judgment and ability of the clinician to select intelligently and to compound skillfully the material which will do the job best.

PREPARATION FOR DOWEL CROWN

There is no standardized tooth preparation for a dowel crown. When the natural tooth is prepared, if from 3 to 4 mm. of vertical crown dimension is allowed to remain around the lingual half of the circumference, the cast form of the artificial crown adapted to the prepared tooth counterpart will provide resistance of retentive value in addition to that provided by the dowel alone. This total circumferential grasp also serves as a reference guide for the accurate seating of the complete crown (Fig. 1, left). The volume occupied by the dowel stub within the substituted coronal region is much less than that occupied by the natural pulp and its required protective coat of dentin in other types of crowns. This permits the use of a completely adequate bulk of tooth color material which helps to insure color control.

A stump wheel to reduce the major bulk of the existent clinical crown (Fig. 1, left) and a bullet-shaped blunt-nosed tool to reduce the contours of the axial surfaces and to extend the preparation into the subgingival region (Fig. 1, left) are suitable instruments for obtaining a desired tooth preparation form. It is well to provide for the greatest vertical reduction on the labial or buccal surfaces of the tooth in order to display as little metal as possible by reduction beneath the height of the free gingiva (Fig. 2, center). The dowel should engage from two thirds to three fourths of the length of the natural root. The roentgenogram provides the record from which the length of the root is ascertained. It is sometimes advantageous to make up the dowel of stock wrought wire before preparing the root canal to receive it.

When the endodontic treatment is carried out, the silver point technic should be avoided because the silver wire will interfere with or make almost impossible the instrumentation of the canal. A canal sealer having the consistency of gutta-percha is satisfactory. A straight, clean dowel chamber is prepared to about two thirds the length of the root with a flame-shaped bur slightly larger in diameter than the dowel which is to be used. The root canal affords the correct direction for the dowel hole. The point of the bur will feed into the gutta-percha and be

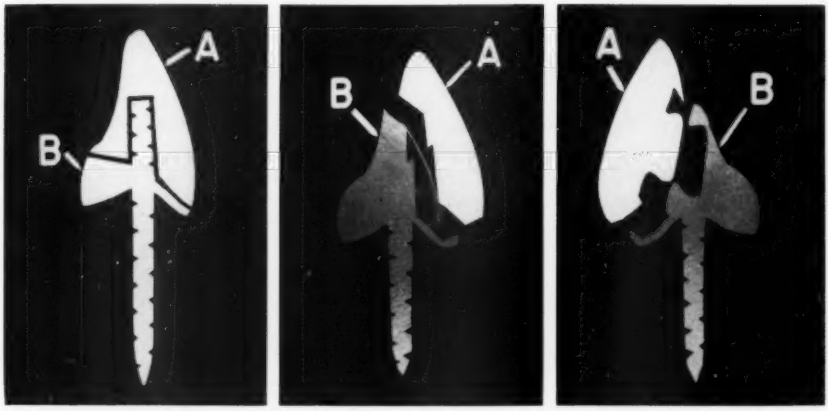


Fig. 2 • Left: A: Tooth-colored crown material. B: Metallic T frame. Center: Acrylic faced dowel crown design in which wire loops and marginal metallic undercuts provide mechanical retention for resin. A: Acrylic resin. B: Cast metal backing. Right: Use of acrylic resin in bulk is emphasized and it is retained by an adequate metallic design. A: Acrylic resin. B: Cast metal backing

directed by the canal channel with little danger of driving out of the canal into root dentin. There is added advantage if the dowel is made of threaded wrought wire about 13 to 14 gauge for cuspids and maxillary central incisors and 17 gauge for maxillary lateral incisors and mandibular incisors. When multiple dowels are inserted, such as might be used in the maxillary first bicuspid or multiple rooted molars, 18 gauge wire is sufficient. The threading serves a twofold purpose by assisting in the retention of the cement to the dowel at the root end and in the maintenance of the wax crown model to the dowel at the other. The dowel must not bind and should extend 3 to 5 mm. out of the preparation (Fig. 1, center). It is possible to taper the dowel form slightly, but the greatest resistance is obtained by retaining the same diameter for most of its length. The root end is blunted. The physical properties of a platinum-gold-palladium wrought wire that meets the requirements set forth in the A.D.A. Specification No. 7 seem to be particularly well-suited and the crown will cast to it nicely. If the dowel is to be cast, a little greater diameter than for wrought wire will assure comparable strength. A type of C or D gold alloy is used for the casting.

CONSTRUCTION OF CROWN

With the dowel seated in position, a transfer of this clinical region to the laboratory bench for the construction of the crown is necessary when using an indirect procedure. Impressions are taken of the particular segment of the arch involved or of the whole of the arches as judged necessary, and a trustworthy intermaxillary bite registration obtained. Technics and procedures to accomplish this are amply described in the literature. Any reasonable procedure can be adapted. The working die must reproduce accurately the relationship of the dowel or of the dowel hole with respect to other portions of the preparation (Fig. 1, center). This tooth preparation-dowel relationship die becomes a removable component of the working model which includes adjacent and opposing teeth and ridge areas in their intermaxillary performance relationships. Knowledge of these relations is necessary to guide prosthodontic construction so that the physiological functional requirements are fulfilled.

The metallic core of the dowel crown may be represented by the T shape (Fig. 1, right). The cross bar of the T which is cast to the dowel represents the horizontal metallic fill-in between the tooth-colored crown and the prepared root form; the vertical part of the T (Fig. 1, right) represents the dowel. This principle in mechanical engineering design is utilized in adapting the crown materials of choice. Given knowledge of the physical properties possessed by the cast metal form (Fig. 2, left) and of the tooth-colored crown material selection (Fig. 2, left), correct differentiation in mechanical design must be considered in the upper surface of the frame and dowel. This is a problem in engineering distinctive to each individual instance.

Modified manufactured porcelain denture teeth and bridge facings that possess retentive slot or pin features make reasonable "faced" type adaptations. The crown type porcelain manufactured pieces, such as the "tube" tooth or the Cerami-Crown or other similar whole crown designs, may be modified by grinding to meet the individual requirements. By vitrifying the correct selection of porcelain to ground manufactured pieces, wide discrepancies that could occur may be largely eliminated. With the completely fired, properly formed porcelain piece correctly related to the dowel and to the preparation, the interpolated space is filled in with casting wax and the remaining portions of the axial anatomy established. The bulk of wax in the region of the lingual cingulum of the pat-

tern is a good site for sprue adaptation. The materials of recent development in which the porcelain is fired directly to the cast gold alloy are also adaptable.

When considering the use of self-cured or heat-cured acrylic resin, the cast surface to which it cures must be adequate in lock-in design. The dimensional instability inherent in this resin demands that undercuts be provided in the casting or wire loops be cast. The greatest thickness of acrylic resin must be provided for throughout the surface area covered (Fig. 2, center and right).

When dowel crowns of similar material and design to those described are used as bridge retainers, the proximal area immediately adjacent to the connector must be provided in metal. The same attention must be given certain interocclusal articular relationships where the use of metal, not tooth-colored material, is preferable.

One of the most widely used and most serviceable type of dowel crown is that known popularly as the Richmond crown. It is usually constructed by applying a suitably colored manufactured pin facing ground to meet the specific technical needs and allowing the pins to straddle the dowel. Casting the metal backing is more common than fabrication from rolled metal plate and solder. The dentist who utilizes this crown type in instances in which it is intelligently indicated, and who takes the time to follow the basic principles and also has technical skill and good esthetic taste, has at his command a prosthodontic device of quality.

SUMMARY AND CONCLUSION

The probability of achieving success with the dowel crown is good when the foundation that supports it has received proved endodontic therapy. The dowel crown utilizes artificially the same principle in mechanical retentive design as does the natural tooth in the alveolus. The dowel crown has proved itself to be a most useful unit tooth substitution or fixed partial denture retainer.

The modern science of endodontics has proved in large degree that its procedures and technics justify consideration in the light of acceptable health practices. With the advances in endodontic therapy, it is likely that there will be increased professional use made of the dowel crown.

*Professor of restorative dentistry, University of Kansas City, School of Dentistry.

Sports and Sport Injuries • To many people sport means competitive sport and the development of outstanding athletes. . . . Let us not forget, however, that the large number of sport participants fail to reach top standards. Their efforts are not wasted and their work is just as important. The greatest value of sport is in raising the general standard of physical and mental health in the community. . . . It becomes important to pay attention to the prevention and treatment of sport injuries. Some sports have hazards peculiar to themselves, brain damage in boxers, jaw and tooth impairments in footballers, head injuries in cyclists and fractured legs in skiers. The treatment of sport injuries is peculiarly difficult because of the tendency, particularly in competitive sports, to return to activity before recovery is complete. The pressure for such premature resumption of sporting activity comes not only from the athlete himself, but even from clubs and schools, and must be resisted by physicians and dentists at all costs. Such premature resumption of sport activity before recovery is complete only leads to further complications and prolonged disability, both of which are harmful, not only to the athlete but to clubs and schools. It should be realized that it never pays to have unfit men participate in sports. *L. T. Wedlick, Sports Injuries, The Medical Journal of Australia, June 13, 1959.*

The relation of dental health to general health

Sholom Pearlman, D.D.S., M.S., Chicago*

Early in 1960, the Commission on the Survey of Dentistry asked a number of leaders in different fields of health to appraise the importance of dental health care in relation to sound health service. The 32 responses varied in emphasis and extent, but certain considerations were expressed with a high degree of accord. Recognition of these basic features reflects thoughtful and courageous evaluation of the matter on the part of dentists and nondentists alike. The following synthesis is based on the statements that were submitted to the Commission on the Survey of Dentistry.

HEALTH

Health is the optimal condition of the whole human organism and it cannot exist if there is disease in any part of the body. Going beyond this axiom, the World Health Organization now considers health as the state of "complete physical, mental and social well-being and not merely the absence of disease or infirmity." This enlightened outlook underlies the activities of all the health professions, including dentistry. Recognition of the principle of total health represents a major advance in the philosophy of humanity and the progress of civilization. Any attempt to segment the total health status of the human body into anatomic areas or specific organ functions is neither practical nor realistic.

Health service, on the other hand, demands segmentation as knowledge and understanding of disease, prevention and treatment continue to increase. Divisions develop within the health professions as a matter of course when the accumulation of facts grows beyond the capacity of any one individual to absorb them all and far beyond the ability of a single practitioner to apply them effectively and efficiently.

DENTISTRY AS A BRANCH OF HEALTH SERVICE

Dentistry evolved early as a distinct field of health service when it became evident that individuals who concentrated their attention on the diseases peculiar to the oral regions developed a degree of familiarity with these diseases which others could not hope to achieve without similarly restricting their interest and activities. Intelligence and common sense indicate that problems in special areas of healing be referred to those who are best qualified to deal with them. The dental profession has reached its present position

and stature by investigation and continual improvement of diagnostic, preventive and therapeutic information and procedures, directed toward maintaining health in areas of healing which have become its acknowledged responsibility.

Because a high degree of specialization has been necessary to achieve this end, dental health care has come erroneously to be looked upon, in some circles, as a service with little relationship to general health problems. Dentists have never lost sight of the vital contribution they make toward health maintenance, but the mere fact that the essentiality of dental service can be questioned at all indicates that the important role of dentistry has been obscured to some extent.

DENTISTRY'S VITAL ROLE IN HEALTH

It must be recognized that, in this country and in other fortunate nations, dental disease is seldom a direct cause of death. This is not because diseases of the oral structures cannot result in death, for they do cause fatalities if they are not treated or arrested in their progress. Malignancies originating in the mouth and jaws still account for 5 to 10 per cent of all deaths from cancer; and infections of the teeth and oral tissues can lead to death in many parts of the world where health service is not adequate and especially where malnourishment and debilitation are common.

In our society, dental disease rarely has a fatal outcome because dentistry has already attained a relatively high level of development. Moreover, the public is accustomed, by and large, to seek treatment at the first signs of distress and more people are learning to have oral examinations at periodic intervals even in the absence of discomfort. As a result, it is almost always possible to detect and treat disease conditions long before they approach the life-threatening stage. Consequently, critically serious sequelae of dental disease are seen infrequently. When they do occur, they receive as much attention in the dental profession as a case of smallpox or leprosy arouses in medical circles. Where advanced dental service is generally accessible, it is taken for granted that dental disease is of minor consequence because death resulting from untreated dental abscesses, osteomyelitis of the jaws, monilial infection ("thrush") and other killing conditions is largely a thing of the past. Public health authorities know that in regions where health is poor and care is not readily available the killing potential of dental diseases is very much a thing of the present.

When dental disease progresses to the point where symptoms of general illness appear, they can be alleviated to varying degrees by procedures employed in the treatment of similar symptoms that arise from like conditions in other organs of the body. Abscesses can be drained; infection can be stemmed with antibiotics; pain can be relieved with analgesics. But the sufferer cannot be restored to a sound state of health unless the offending condition is eliminated, and it is the dentist, backed by the accumulated knowledge of his profession, who has the necessary information and the carefully cultivated skill to perform this essential function.

When the general physician strives to maintain health in the face of a disease condition that requires surgical intervention which he himself is not prepared to perform, the service of the surgeon is regarded as essential. Although in a generalized illness of dental origin the crisis may develop more gradually, and the relationship between physician and dentist is rarely so dramatically obvious as this, it is nevertheless apparent that in such situations the intervention of the dentist is likewise essential to the maintenance of health.

Dental health service contributes to the preservation of life by arresting the progress of infections that originate in the teeth, tongue, lips, jaws and associated

structures. These conditions include tooth decay, gingivitis, periodontitis, pericoronitis, abscesses, infected cysts and their sequelae.

Dentists perform essential health service in the early diagnosis of cancer, blood diseases (leukemia, anemia), nutritional deficiencies, arthritic disturbances, and other conditions that may have far-reaching effects on the human organism. In treating these conditions, other health professions may assume major responsibility, but early recognition by the dentist often determines whether treatment will be instituted before it is too late.

DENTAL HEALTH AND EFFECTIVE LIVING

The saving and prolongation of life, although certainly the most critical concern of all health professions, is only part of the broad objective of health service. Poor health, when it reduces productivity and efficiency, diminishes the individual's ability to contribute to society, his family, and his own well-being. Health service ideally is aimed at enabling everyone to work at full capacity toward the fulfillment of happy and purposeful living.

Because discomfort and pain disturb living patterns, dental service is sought most often for removal of certain of the interfering factors. Usually these symptoms appear only temporarily, as signs of acute dental disease conditions, and the equanimity of the patient is restored after successful treatment. Mental attitudes and emotional factors, however, are now universally recognized as highly important influences on the degree to which the individual can achieve well-rounded, effectual living. In everyday life we communicate with each other primarily with the mouth and face. Any disfigurement of these parts of the body that interferes however slightly with acceptable speech or appearance may give rise to serious emotional problems and maladjustment of personality. These, in turn, can significantly and sometimes completely hamper the individual's relationships with others and severely restrict his activities throughout his lifetime.

Dentistry meets this challenge in virtually every phase of practice. Most spectacular and dramatic are the results achieved in the correction of cleft palate and cleft lip, congenital defects which occur in one out of every 800 persons born alive in this country. The emotional, social and economic battles which victims of this affliction must fight through life cannot be comprehended fully by those who have not associated intimately with them. The dental specialist is the key member of teams that provide treatment for these patients at cleft palate clinics in various parts of the world.

Malocclusion, which includes "buck teeth," "lantern jaw," and less noticeable but equally disturbing dental conditions, may create serious psychological problems, especially in children and young adults. Orthodontists perform a vital humanitarian service in restoring self-confidence and happiness which usually are lost when the child becomes aware of the esthetically undesirable facial appearance that accompanies this dental defect.

In adolescence, the appearance of the teeth and mouth assumes outstanding importance in relation to social acceptance, particularly by the opposite sex. Inflamed or bleeding gums, decayed, misaligned, or discolored teeth are unsightly. Spaces created through the loss of teeth by accident or neglect present opportunities for comment and ridicule. Withdrawal from society, to different degrees, is the common response to the situation unless the offending conditions of the mouth are corrected through dental care.

Adults, no less than youth, are keenly sensitive about appearance, which is important both in business and social relationships. The psychological ramifications associated with tooth loss and the prospect of artificial dentures are extensive

in middle-age and later life. Dental service contributes immeasurably to the maintenance of emotional serenity in the face of aging. Prosthetic restorations and appliances of today often are considerably more attractive than the natural teeth they replace. Restoration of the vertical relationships of the jaws, accompanied by elimination of wrinkles, drooping lips and sagging cheeks, rejuvenates the appearance of the face at a time when appearance is important to personality and adjustment. The impact of prosthetic dental service on the physical and mental health of older individuals enables them to prolong the years of usefulness to the community and the enjoyment of life as a whole.

CONCLUSIONS

The foregoing broad considerations indicate clearly that health service is not complete if the health of the oral structures and all they represent is excluded or glossed over. Any reflective appraisal is bound to establish incontrovertibly that dental care is an integral and essential part of sound health service. Moreover, it appears likely that dental health service will continue to grow in importance when present concepts of health are modified by further enlightenment and the adoption of higher standards.

*Secretary, Council on Dental Research, American Dental Association.

The Fourth Dimension of Dental Education • If dental education is going to assume its part in providing the necessary manpower requirements, it is going to have to do some self-analysis and initiate certain fundamental changes. These changes will affect all the other segments of the dental profession and will necessitate a change in the "follow-the-leader" attitudes we seem to have adopted in recent years. It may mean that our greatest need in the future will be to break with the traditional dicta of today's leaders. . . . Great latitude should be allowed and educational experimentation encouraged, not frowned upon and actually opposed, as it has been in the past. Attempts to standardize and force into patterns should be avoided. Practically all of the dental schools are integral parts of universities and can be trusted to embark on legitimate programs. Prescription of pre-dental subjects should be liberalized. . . . Selection of students must be reappraised. We have rather good measuring devices today to identify the student who has promise of developing as a competent practitioner, but little or no way of identifying the applicant who has the potential to develop as a professional man, with all of the intangible attributes and qualities of personality which we like to see in such people. Such identification will not be easy. A great many programs to accomplish this objective will have to be tried. The time to start them is now. . . . It is my belief that we, as dentists, have faced up to solving the problem of relating dentistry and dental education to the world around us. We have come to the realization that if we do not, non-dentists will do it for us, and history has shown that when problems are solved by legislatures it is only the quantitative aspects that are solved. We are strongly aware that the people granted us, through licensure, a monopoly to practice dentistry and for this expect us to produce competent dentists and to render good dental service. This we have done and are doing. Further than this, the people expect us to provide leadership and guidance in the field of our competency. This we recognize, even though it leads us out of the present dimensions of practice. We know that the members of a profession must be concerned with the total welfare of the people, not a segment—particularly our own segment. When we think of ourselves only as a profession with isolated problems to be solved, it is three dimensional thinking. When we think of ourselves in relation to the world around us, we are approaching fourth dimensional thinking, even if this means "preceding our leaders behind us." *Willard C. Fleming. New Dimensions of Learning in a Free Society, 1958.*

1960

Luther H. Butler
NORTH CAROLINA

The president of the North Carolina Dental Society is Luther H. Butler, a general practitioner in Greensboro. Dr. Butler obtained his D.D.S. degree from Atlanta-Southern Dental College in 1926. He has taken post-graduate work in endodontics at the University of Pennsylvania, Georgetown University and the University of Michigan, and has taken postgraduate work in crown and bridge at the University of North Carolina.

Dr. Butler has served on the executive committee of the American Association of Endodontists since 1957. He has been a member of the executive committee of the North Carolina Dental Society since 1956. He has served as secretary-treasurer and president of the Guilford County Dental Society, and as secretary-treasurer of the North Carolina Dental Society. He is a member of the Fédération Dentaire Internationale, Southern Endodontic Study Club, and of the Masonic Lodge, Shrine, Kiwanis Club and Odd Fellows.

Dr. Butler is unmarried. He is a member of the First Baptist Church of Greensboro. He is a Fellow of the International College of Dentists. He has presented table clinics on endodontics at local, district, state, national and international meetings.

Peter A. Matteroli is president of the Colorado State Dental Association. He is a graduate of the University of Denver where he received his D.D.S. in 1923 and a general practitioner in Grand Junction. Dr. Matteroli has served five times as president of the Mesa County Dental Society, and is a past president of the Western Colorado Dental Society. He is a member of the Chamber of Commerce, a past exalted ruler of Elks Lodge 575, a past president of the Lions Club, a director of the Mesa Federal Building & Loan Association, a board member of the Atomic Loan Company, a past president of the Parent-Teachers Council of the local high school, and a member of the Pierre Fauchard Academy. He is married and the father of two—Mrs. Sandra J. Edmunds, 22, and Peter Stewart, 18. His hobbies are golfing, skiing, fishing and hunting.

Peter A. Matteroli
COLORADO

Minor O. Turrentine
GEORGIA

Minor O. Turrentine, a general practitioner in Columbus, is president of the Georgia Dental Association. Dr. Turrentine received a certificate from Georgia Normal College in 1925, after which he attended Atlanta-Southern Dental College (Emory University). He received his D.D.S. in 1929. He has served as president of the Dental Society of the Western District of Georgia and is a member of the Pierre Fauchard Academy. Dr. Turrentine is a Baptist, and has been active in work for both the Boy Scouts and Girl Scouts. He served in the U.S. Navy during World War II as a dental officer in the Pacific theater with Corps Evacuation Hospital III on Okinawa. Dr. Turrentine is the son of Minor H. Turrentine, a dentist and active member of the Georgia Dental Association from 1903 until his death in 1951. Dr. Turrentine is married and the father of a son, Minor O., 11. His hobbies are youth activities and boating.

State Dental Association Presidents

Henry A. Merchant, a general practitioner in Omaha, is president of the Nebraska Dental Association. He attended the Woodbine Normal School for three years, and received his D.D.S. in 1913 from the Creighton University School of Dentistry, where he subsequently served as demonstrator and lecturer. Dr. Merchant is a Fellow of the American College of Dentists, and holds membership in the following organizations: Delta Sigma Delta, Woodbury Gold Foil Study Club, Research Gold Foil Study Club of Nebraska, American Academy of Gold Foil Operators, American Denture Society, American Society of Dental History, Omaha Rotary Club and Omaha Chamber of Commerce. Dr. Merchant has served as president of the Omaha District Dental Society; he served two terms as a member of the Nebraska State Board of Dental Examiners. He is married and the father of three—Mrs. James A. Reilly, Mrs. Edward Forgy, and Dr. Eugene S. Merchant, a dentist. Dr. Merchant is active in church affairs.

Henry A. Merchant
NEBRASKA

Leland T. Coffey
TENNESSEE

Leland T. Coffey is president of the Tennessee State Dental Association. He is a general practitioner in Knoxville, and received his D.D.S. in 1928 from the Atlanta Southern Dental College. He holds membership in the following organizations: American Society of Dentistry for Children, American Association for the Advancement of Science, Royal Society of Health (England), Pierre Fauchard Academy, Fédération Dentaire Internationale, Southern Academy of Oral Surgery and Southeastern Academy of Prosthodontics. He is a Fellow of the International College of Dentists. Dr. Coffey is a member of the Sequoyah Hills Presbyterian Church. He is a member of the Chamber of Commerce, Lions Club, Cherokee Country Club and the Elks Club. Dr. Coffey was coronated a 33rd degree Mason in 1957 and presently serves as Venerable Master of the Lodge of Perfection in Knoxville. He also is a member of the Executive Club. He is married and the father of two sons, James L. and Thomas L.

H. Arthur Zappe
TEXAS

H. Arthur Zappe is president of the Texas Dental Association, and a general practitioner in Mineral Wells. Dr. Zappe received his D.D.S. from the University of Texas Dental College in 1927. He is vice-president of the American Association of Dental Examiners, past president of the Texas State Board of Dental Examiners, and past president of the Fort Worth District Dental Society and the West Texas Dental Society. He is a member of Psi Omega, Omicron Kappa Upsilon, Pierre Fauchard Academy, and a Fellow of the American College of Dentists and the International College of Dentists. Dr. Zappe organized the Palomino Horse Breeders of America in 1941 and has since served as that organization's secretary. He is known in many countries for his interest in palomino horses. Dr. Zappe is active in many civic organizations and is a director of the City National Bank. He is married and the father of Joan Davis, 25. He operates farms and has oil interests.

editorials

The one-hundred and first annual session ushers the Association into its second century

The one-hundred and first annual session of the Association is being held in Los Angeles October 17-20. There is something symbolic about the selection of Los Angeles for the site of this year's session—symbolic in the sense that the Association's first century of service was launched in an eastern seaboard state—its second century is to be launched on the West Coast.

Thirty-eight years have elapsed since the American Dental Association last met in Los Angeles. During that time both the city and the Association have experienced many benefits. In 1922, metropolitan Los Angeles had a population of some 900,000. Today, its population exceeds 6,000,000. Then, its chief claim to fame was its climate and its cinematic industry. Today, it still boasts of both although industrial equipment has surpassed the movies as a chief commercial output.

In 1922 the Association's 30,000 membership provided the American dental profession with only latticelike representation. Today, its membership of 95,000 blankets American dentistry. Attendance at the first Los Angeles meeting was less than 5,000. This year's session will triple that number. Then, the Ambassador Hotel accommodated the session amply—the meetings of the Board of Trustees and the House of Delegates, the general meetings, the scientific section program, the clinics and the exhibits. Only the new and unique Great Public Health Exhibit—open to public and profession alike—had to be housed in a tentatorium on the hotel grounds. This year, the Statler Hilton Hotel serves as Association headquarters while the city's new Sports Arena will house the scientific sessions.

In 1922 William S. Hart, moviedom's pioneer western hero, and Fritz, his equally famous pinto pony, highlighted the entertainment. This year the Los Angeles Philharmonic Orchestra has that assignment. The slogan for the sixty-fourth annual session, over which President Thomas B. Hartzell presided, was "Dentistry can add

ten years to life." Since slogans were lost to dentistry somewhere during the Association's first century, President Paul H. Jeserich, this year, must preside sans slogan at the one-hundred and first annual session. This year's scientific program, however, like Dr. Hartzell's of a generation ago and like all others before and since, presents the latest, most important developments in dentistry designed to "add years to life."

These developments will be presented at the annual session in Los Angeles this month through the medium of 82 essays delivered in 16 panel discussions, 3 forums, 1 symposium and 1 seminar; 28 clinical lectures, 169 table clinics, 39 student clinics, 11 motion pictures, 39 scientific exhibits and 191 commercial exhibits. In addition to the programs held by the 12 scientific sections, the Board of Trustees and the House of Delegates will each hold a series of meetings to transact Association affairs, delegates of each of the 13 Trustee Districts will hold their separate caucuses and at least 12 organizations interested in specific phases of dentistry will meet during the previous week.

The Council on Scientific Session is to be congratulated on the content and quality of this year's program. It represents the tremendous advances made by dentistry since the Association first met in Los Angeles 38 years ago. It is in keeping with the import of the one-hundred and first annual session. It is one which will usher in worthily the Association's second century.

Dietary additives for caries prevention

The prompt and comprehending manner in which American communities have adopted fluoridation—1,922 communities, 37,057,385 population[1]—and the proved worth of the process have stimulated dental investigators to search for other nutritional additives which will prove even more effective than fluorine in preventing dental caries.

One of the most interesting studies in this regard currently being conducted by the National Institute of Dental Research concerns the use of dibasic calcium phosphate.[2] Prompted by evidence that dental caries in white rats can be reduced dramatically by adding a mineral phosphate to bread fed the experimental animals, the Institute has undertaken a study to determine what effect this dietary additive may have on human teeth. Since 1959 the Institute, in collaboration with the Division of Indian Health of the Public Health Service, other federal agencies and the South Dakota State College, using the pupils of eight boarding schools in the Dakotas for test purposes, has been studying the anticariogenic effect of special phosphated bread. The study calls for a minimum of three annual surveys of the children in order to evaluate the efficacy of dibasic calcium phosphate as a caries control measure.

Studies conducted by Nizel and Harris[3] at the Massachusetts Institute of Technology, reported in the February 1960 issue of THE JOURNAL, tend to corroborate the N.I.D.R.'s findings. Working for 42 days with two comparable groups of hamsters, they determined that the addition of 1.36 per cent of metaphosphoric acid to the diet of one group reduced the incidence of caries 70 per cent. The third molars

were particularly responsive to the nutritional treatment. They were most caries-susceptible in the hamsters which were fed a caries-producing diet and most caries-resistant in those hamsters which were fed the phosphate supplemental diet.

A realization that phosphorus in some form is essential to dental health is by no means new. In 1917 Sherman and Gillett,[4] at the completion of a survey of ninety-two families in New York City, concluded that "a proper relationship between calcium and phosphorus in the diet safeguards skeletal and tooth development." E. V. McCollum,[5] one of the nation's best known nutritionists, wrote in the nineteen-twenties of the importance of calcium and phosphorus intake to dental health. Mariel Hopkins,[6] writing in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION more than a third of a century ago, asked: "Is it any wonder that when we have a disturbance in the metabolism of calcium or phosphorus, we have a disease with diverse manifestations such as faulty bone development and delayed and faulty tooth structure . . ."

Dental literature in the decade following World War I and well into the nineteen-thirties was rich in speculation regarding the effect of diet and nutrition on dental health. The names of Toverud, Marshall, McCollum, Sherman, the two Mellanbys, Price, Marriott and many more, heavily dot the pages of dental journals of that day. Although their reports were based more on clinical observation and speculation than on scientifically controlled studies, current investigations may prove that their teachings were far from unsound.

The demonstrated anticariogenic effectiveness of one nutritional supplement, fluorine, and that promised by another, dibasic calcium phosphate, serves not only to strengthen the premises of yesterday's nutritionists but to stimulate today's researchers to explore fully the entire field of nutrition as it pertains to the health of the oral tissues.

1. Report Health Education and Information Section, Division of Dental Public Health, U. S. Public Health Service, July 7, 1960.

2. Highlights of progress in research on oral diseases 1959. Public Health Service publication No. 760. Washington, D.C., U.S. Government Printing Office.

3. Nizel, Abraham E., and Harris, Robert S. Phosphates and dental caries. J.A.D.A. 60:193 Feb. 1960.

4. Lewis, Howard B. The role of the inorganic elements in nutrition. D. Cosmos 68:950 Oct. 1926.

5. McCollum, E. V.; Orent-Keiles, Elsa, and Day, Harry G. The newer knowledge of nutrition, ed. 5. New York, Macmillan Co., 1939.

6. Hopkins, Mariel. Fundamentals of nutrition and results in research. J.A.D.A. 13:1324 Sept. 1924.

Funds for research in the fields of health

If 1960 federal government appropriations may be taken as criteria, the nation's interest in protecting man from the hazards of war, automobiles from the hazards of rutty roads and wildlife from the hazards of rod and gun far outweighs its interest in protecting humanity from the hazards of want and disease.

This not too complimentary observation is prompted by figures[1] recently released by the National Health Education Committee, Inc., and for which THE JOURNAL is indebted. Some of the figures follow:

ESTIMATED 1960 FEDERAL GOVERNMENT APPROPRIATIONS: $78,000,000,000

For National Institutes of Health activities	For other activities
National Institutes of Health—total budget $400,000,000	Defense against military attack $41,000,000,000
Cancer research $73,000,000	Space exploration $427,000,000
Cardiovascular research $47,000,000	Improvement of highways $3,000,000,000
Arthritis and metabolic disease research $40,000,000	Fish and wildlife service $68,000,000
Neurological diseases and blindness research $31,000,000	The 1960 census $69,000,000
Arteriosclerosis and hypertension research $18,000,000	Administering public lands $86,000,000
Allergies, infections and other disease research $59,000,000	
Dental research $7,000,000	

To these amounts must be added $190,000,000 allocated for research by the drug industry, $17,344,000 by the Veterans Administration and $28,786,554 by America's major voluntary agencies such as the American Cancer Society, the American Heart Association, the National Foundation, and others.

Despite the relatively small appropriations for medical research in comparison to appropriations for other essential purposes, the nation's health is gradually improving. Between 1943 and 1958 average life expectancy increased from 63.3 years to 69.5 years. During approximately that same period, deaths from pneumonia declined 26 per cent, from syphilis 74 per cent, and from tuberculosis, 82 per cent. Infant deaths declined 32 per cent. One of the most gratifying results of medical research in recent years has been the 94 per cent reduction in acute poliomyelitis—a reduction brought about by the discovery and use of Salk vaccine.

Lastly and certainly not to be overlooked is the dramatic impact which research is having on the nation's dental health—research which has resulted in the adoption of water fluoridation by a growing number of communities to reduce the incidence of dental caries among children. Although funds for dental research stand low on the list of public and private appropriations, results therefrom stand high in the order of achievements. A sixty per cent reduction in the incidence of dental caries among children who enjoy the benefits of fluoridated water is no mean accomplishment.

Although $7,000,000 for dental research is small indeed in comparison with $3,000,000,000 for highways or $68,000,000 for fish and wildlife service, it is gratifyingly greater than was appropriated by the federal government for dental research a few short years ago. Furthermore, now that federal authorities are slowly becoming aware of the enormity of the nation's dental needs and of the profession's needs for research leading to the prevention of dental disorders, dentistry may look forward with some degree of assurance to a more equitable apportionment of federal funds for dental research than is indicated by the figures of the National Health Education Committee reprinted above.

1. What are we spending to save our lives through medical research? The National Health Education Committee, Inc., 135 E. 42 Street, New York.

international dentistry

News from Great Britain

British Dental Association • From the report of the Representative Board to the Annual General Meeting, Edinburgh, July 1960, the following items are taken:

Loss of Members • With deepest regret the Board recorded that during the past year 144 members of the Association have died, including honorary members Lilian Lindsay and M. F. Watry, and vice-presidents Edgar Houghton and Joseph Lauer.

Finance • With the increase of subscription by 80 per cent to nine pounds, nine shillings, in spite of a fall in membership of about 5 per cent the income from subscription showed a satisfactory increase.

Membership • The membership of the Association on January 1, 1959, was 10,950 and at December 3, 1959, was 10,345, or 5.5 per cent less than it was at the end of 1958.

Election of Council • The nine retiring members, except R. Morgan who resigned, were all re-elected, together with P. Roberts as a new member.

Changes in the Secretariat • Mr. J. N. Peacock took up his duties as secretary in September 1959. He has already proved that he has the qualities of discretion, tact, and the ability to master details and present them clearly.

National Health Service • During the year the Association has been occupied with giving evidence before the Royal Commission on Remuneration of Doctors and Dentists, the contribution of the Dental Estimates Board, conditions of practice in the General Dental Service, the Dental Formulary and making new drugs and preparations available to dental practitioners for prescription under the Health Service, and also Superannuation.

Dental Health • Throughout the year the Dental Health Committee continued their work of disseminating information about aspects of dental health. They have also set up a subcommittee "to consider the whole problem of fatigue in dentistry and to make recommendations."

Library Museum • The Library has had an exceptionally busy year and a printed catalogue is published and on sale. The Museum has received a large number of interesting gifts during the year.

Public Relations • The Council have set up a subcommittee to interpret the policy of the Association as laid down by the Representative Board.

Dental Education • The Association has noted with some satisfaction the announcement of the Minister of Health of the building of new dental schools in Cardiff, Birmingham and University College Hospital, London, and the decision to increase the output of the dental schools at Kings College and London Hospitals, Bristol, Newcastle, Leeds, Manchester and possibly Liverpool.

Many other spheres of activity were reported on including local authority services, the *British Dental Journal*, annual conferences and representation.

Prevention • A timely editorial in the June 21 edition of the *British Dental Journal* on prevention being better than treatment contains the following passages:

"Since the early days of this century an abundance of new tools and new equipment has been produced for the dentist. Some of it has proved to be of great help in the provision of the ever-widening scope of dental treatment; much has been discarded.

"By far the greater part of this equipment is designed and mainly used for conservative treatment of the teeth and that part of [treatment] which relates to the restoration with artificial substitutes of tissue lost through caries. Fillings in ever-increasing numbers

occupy more and more of the time of the dentist but probably in most parts of the world he is fighting a losing battle.

"No dentist who works with modern equipment can fail to be impressed by the tremendous benefits it bestows on both patient and operator, and the treatment of dental disease by conservation of teeth is unquestionably better than by extraction, but the be-all and end-all of dentistry is not filling holes, important though this activity may be.

"Improved means of preparing cavities, advances in methods of sedation by injection or inhalation anesthetics or by suggestion, and improved materials for fillings should not obscure the fact that these are only second best ways of controlling dental caries.

"The real result may be seen in the National Health Service today, where the increasing treatment of more and more dental disease is hailed as an advance; the prevention of it neglected.

"In Great Britain the great bulk of dentistry is controlled by the State; if the National Health Service is to be justified by its works it must seek to lessen the requirement for the treatment of disease. The dental side of the Service should be so developed that prevention will rank at least as high as treatment, and offer opportunities not less than those of any other branch.

"Dental surgery will always be required, but it is to dental medicine in its connotation of prophylaxis rather than therapy that our thoughts for the future should be turning."

National Health Service • In its report in 1956 the McNair Committee recommended that relaxation of the existing rules governing prior approval should be considered as a means of removing or mitigating one practical cause of professional irritation. For three and a half years the British Dental Association has been strongly pressing the Ministry to implement this recommendation and the result of the detailed discussions that have taken place is to be seen in the publication of the new regulations for the General Dental Services which came into force on July 1.

The following is a summary of their main effects:

1. It is no longer necessary to obtain the approval of the Dental Estimates Board before carrying out the following items of treatment: apecectomy; gold fillings, meaning "plugged filling," not inlays; the provision of one post crown, and the initial provision of complete upper and lower acrylic or vulcanite dentures after the extraction of all the remaining teeth during the same course of treatment for patients aged 35 or over.

2. The rule concerning supplementary and amended estimates is revised so as to make it clear that the practitioner is required to notify the Dental Estimates Board only if the variation involves new treatment which itself requires prior approval.

3. The list of drugs and preparations which may be prescribed by the practitioner on form E.C.14 is extended by the inclusion of a number of new items and notably by the addition of an antibiotic (tetracycline) as an alternative to penicillin.

4. The right to employ dental hygienists in general practice, promulgated by regulations made by the General Dental Council in 1957, is formally acknowledged as applicable to Health Service practice.

The increase in clinical freedom brought about by these changes in the prior approval requirements constitutes the first major improvement, from the profession's point of view, in the principles that have governed the dental services since the Act came into force.

These regulations however cannot be considered to be other than an experiment which the Government has been persuaded to adopt in the interests of the Health Service, and the results of the experiment will lie in the hands of the profession. Both the Minister and Association will watch the results in the most careful manner. The Association will, in particular, be looking for evidence which will justify further relaxations and lead to another step towards complete clinical freedom. This modification of prior approval is a lifting of control in a small way for the purpose of ascertaining the result of the application of a principle: its future effects will be of far greater importance than the immediate ones.

Items of Interest • At the annual representative meeting of the British Medical Association held in Torquay in June, a resolution was moved in the following words: "That this meeting strongly urges that the fluoridation projects now in progress in the United Kingdom be extended where necessary and expedited." The motion was supported on three grounds:

1. The present high incidence of dental caries.

2. The great weight of scientific evidence from leading authorities in favor of fluoridation.

3. The fact that it is an economic, safe procedure which is preferable to all other methods.

The statement was made that in the United States 40 million people were drinking water to which fluorides had been added to improve the dental health of growing children, and a member emphasized the importance of arousing public opinion in this country in favor of

fluoridation and asked for the support of general practitioners in that connection. The motion was carried and without doubt this action of the members of the British Medical Association will be of material help to those who are seeking the extension of fluoridation to those areas where the method of supplying water is suitable for this purpose.

At its meeting last April, the Royal Microscopical Society presented Sir Wilfred Fish with a certificate of honorary Fellowship of the Society in recognition of his pioneer work in dental pathology.

Our congratulations to Duncan Macgregor who was installed as president of the British Dental Association at the annual conference in Edinburgh and to Percy Cocker who was named president-elect. *G. H. Leatherman, D.M.D., F.D.S., R.C.S., F.A.C.D.*

News from Argentina

New School of Dentistry • The Board of Directors of the Province of Corrientes has approved the project of establishing a School of Dentistry as a part of the Universidad del Noreste. There are at the present time three traditional dental schools in Argentina (Buenos Aires, Córdoba and Rosario), a school established a few years ago in Tucumán, and, when this new project in Corrientes materializes, the country will have five institutions dedicated to the teaching of dentistry.

School of Public Health • The College of Medical Sciences of the University of Buenos Aires has established a School of Public Health which will include a department of dentistry and will be under the direction of C. B. de Di Pasquale. It is the second school of this kind in Argentina and will be of great benefit to the population in introducing new concepts in dealing with the problems of public health by specialists in the field.

Public Health Dental Workshop • At the first public health dental workshop of the Provinces of the Litoral (Santa Fé, Entre Rios, Corrientes y Chaco) a resolution was passed recommending to official organizations the addition of specialists in preventive dentistry and public health, and the fluoridation of water for the prevention of caries.

First "Jornadas" of the Argentine Association of Dentistry for Children • The meeting in which pediatricians participated was held August 17-20. For the first time Argentine physicians and dentists cooperated in a scientific meeting to consider the problems of children's dental diseases and their treatment. The result surpassed the expectations of the organizers of the meeting. More than 500 were in attendance at the Argentine Dental Association building and the discussions were followed with extreme interest. The subjects touched on the entire field of pedodontics: operative dentistry, preventive dentistry, treatment of infections, periodontal infections, occlusion, vitamin deficiencies, organization of professional practice, hematology, pathological symptoms and the psychology of the child with special emphasis on the problems encountered by the pediatrician and the pedodontist. The event was organized under the direction of S. Leyt.

New Method for the Determination of Fluoride in Water Supplies • The Argentine chemist, C. J. Sambucetti, in collaboration with a renowned chemist from The Netherlands, I. M. Kolthoff, has found a new method of determining traces of fluoride in water. The researchers received support from the United States Public Health Service and carried out their research at the University of Minnesota School of Chemistry. Dr. Sambucetti is a member of the Commission on Atomic Energy of Argentina and a member of the staff of the College of Chemistry of Buenos Aires.

Visitors from the United States • Sidney B. Finn of the University of Alabama presented a course in children's dentistry under the auspices of the Argentine Association of Dentistry for Children. S. Sigmund Stahl of the Murry and Leonie Guggenheim Foundation for Dental Research, New York University, gave a course on the pathology and treatment of periodontal diseases to the Argentine Society of Periodontology. This course consists of eight three-hour sessions covering both theory and practice. C. C. Steiner and G. Boone of the University of Southern California presented lectures at the Argentina Orthodontic Society and the Argentina Association of Dentistry for Children on those respective specialties.

The three afore-mentioned organizations are components of the Argentina Dental Association in the headquarters of which the courses and lectures were given during July and August.

Juan Chaneles
Rivadavia 519
Quilmes, Argentina

News from Brazil

New Name of the Brazilian Dental Association • The National Deliberative Council of the Brazilian Dental Association met August 11-13 at Poços de Caldas, State of Minas Gerais, during the Second International Week of Endodontics held there at that time. After a discussion of reforms of the bylaws, the following principal changes were approved:

1. The name of the Brazilian Dental Association was changed from União Odontológica Brasileira to Associação Brasileira de Odontologia. All dental associations in Brazil will adopt this name, followed by: section of ..... (name of State), subsection of ..... (name of city).

2. At meetings of the National Deliberative Council the sections (States) will have a maximum of 30 votes. Each group of 50 section members will be allowed one vote. Also, each subsection (city) will have one vote, regardless of its size. A subsection, to be accepted, must have a minimum membership of ten.

Secretary General • At the afore-mentioned session of the National Deliberative Council, the resignation of the Association's secretary general, Marcelo Augusto Galante, was accepted. Dr. Galante had held this post since November 1955. He and the Association president, Professor Alfredo Reis Viegas, have been this reporter's outstanding helpers in supplying the news referring to the Brazilian associative activities in dentistry, for which we are truly grateful. Dr. Galante also resigned from his activities at the São Paulo State Dental Association, in which he has held six important directory posts since 1955.

The Brazilian Dental Association's new secretary general is Jairo Corrêa.

New Dean of São Paulo School • Professor Antônio Adamastor Corrêa has been appointed dean of the School of Pharmacy and Dentistry, University of São Paulo. A graduate of that school in 1940, Dr. Corrêa has been assistant professor, associate professor and head of the department of operative dentistry at his alma mater. He also is associate professor of dentistry at the University of Rio Grande do Sul, in Pôrto Alegre, and was a student of Professor Arthur Gable who taught in São Paulo from 1951 to 1953.

Third ABENO Meeting • At the third meeting of ABENO—Brazilian Association of Dental Teaching—July 26-30 at Diamantina, State of Minas Gerais, it was approved that this association help the libraries of the dental schools by supplying the most important books and journals. After study of the different subjects suggested for dental students, a list of 30 was approved from a total of 111. It was suggested that "twin" departments be separated, and that a minimum of four years were necessary for undergraduate studies in dentistry. The introduction of more postgraduate courses was urged.

It was decided that professors of the same departments of the different schools should meet in order to unify the study of their subjects. Approval also was given to the opening of no new dental schools until the existing ones, totaling 35, are fully equipped to teach dentistry efficiently. ABENO also discussed the statistical study of Brazilian dental schools; this report should be available soon to all those who are interested.

Hans Freudenthal, C.D.

International News in General

SWITZERLAND INAUGURATES FIRST FLUORIDATION STATION

The first fluoridation installation in public water supplies in Switzerland was inaugurated in June in the town of Aigle in the Canton of Vaud near Lake Leman.

The station is under the control of the Swiss Academy of Medical Sciences and supplies water to approximately 4,500 inhabitants.

PERU DENTAL ACADEMY NAMES NEW OFFICERS

Juvenal Llanos was named president of the Academia de Estomatologia del Peru for the 1960-61 season. Other new officers are: vice-president, Julio Begazo Sanz; secretary, V. Raul Iparraguirre; assistant secretary, Alberto Hernandez Morey; treasurer, Jorge Villanueva Meyer, and librarian, Oscar del Aguila. The academy is located at Casilla 2467, Lima, Peru.

ARGENTINE GROUP PICKS BOARD OF DIRECTORS

At a recent meeting of the General Assembly of the Círculo Odontológico Correntino held in Corrientes, Argentina, the following Board of Directors was elected:

President, Óscar Raul Lotero; vice-president, Olindo Branca; secretary, Feliciano Ernesto Muñoz; assistant secretary, Baltazar A. Aquino; treasurer, Alfredo G. Fages, and assistant treasurer, Felipe Schvetz.

news of dentistry

Board of Trustees prepares reports for annual session in Los Angeles

The American Dental Association's Board of Trustees met September 1-3 at the Central Office in Chicago to review Association activities and to prepare reports for the October 17-20 meeting of the House of Delegates.

Among the actions taken by the Board was an acknowledgement of the services rendered to the dental profession and to the Association by the Commission for The Survey of Dentistry in the United States under the distinguished chairmanship of Dr. John Perkins. The Board also resolved that a commemorative certificate be issued to the First District Dental Society of The Dental Society of the State of New York on the occasion of the centennial anniversary of its founding which will be celebrated at the end of 1960.

The following associate editors and member of the Editorial Board of the *Journal of Oral Surgery, Anesthesia and Hospital Dental Service,* were reappointed for the term of three years: Hospital Dental Service Association Editor, William F. Via, Jr., Detroit; Queries and Comments and Clinical Observations Associate Editor, S. Elmer Bear, Richmond, Va.; Editorial Board member, Robert B. Shira, Washington, D. C.

ATTENDANCE

Trustees in attendance at the meeting were: Aloyse E. Kopp (ad interim) Ninth District; William A. Garrett, Fifth District; Laurence L. Lathrop, Third District; Paul K. Musselman, Fourth District; Robert J. Wells, Eighth District; Arthur W. Easton, First District; Maynard K. Hine, Seventh District; E. Jeff Justis, Sixth District; Henry M. Willits, Tenth District; Edward F. Mimmack, Second District; Fritz A. Pierson, Eleventh District; John S. Eilar, Twelfth District, and John R. Abel, Thirteenth District. Officers attending were Paul H. Jeserich, president; Charles H. Patton, president-elect; William A. Fennelly, first vice-president; Gordon L. Teall, second vice-president; Raymond A. Hart, third vice-president; Gerald D. Timmons, Speaker, House of Delegates; Harold Hillenbrand, secretary; H. B. Washburn, treasurer, and Lon W. Morrey, editor.

Dr. Washburn and Dr. Morrey were

appointed to continue in their present posts for another year, through 1961.

OTHER ACTION

Louis A. Saporito, Newark, N. J., was named general chairman of the 1963 General Committee on Local Arrangements for the annual session to be held in Atlantic City.

The Board approved the list of persons to serve on committees for the 1961 annual session in Philadelphia, submitted by Jay H. Eshleman, general chairman of the General Committee on Local Arrangements.

CONSULTANTS

In additional actions, the Board appointed consultants to the various Association Councils for terms ending with the 1961 session. Those appointed to the Council on Dental Health were:

John F. Abel, Chicago; Miss Pearl Bierman, Chicago; Arthur M. Browning, New York City; John W. Castellucci and Keith G. Cone, Chicago; Kenneth A. Easlick, Ann Arbor, Mich.; J. F. Follmann, Jr., New York City; Donald J. Galagan, Washington, D. C.; Irving R. Hardy, Boston; Robert L. Jorgensen, Chicago; Noel Kaho, Claremore, Okla.; Harry M. Klenda, Wichita, Kans.; John C. Post, Washington, D. C.; E. Todd Wheeler, Chicago, and E. S. Willis, New York City.

Named as consultants to the Council on Federal Dental Services were:

Russell W. Bunting, Ann Arbor, Mich.; John G. Carr, Camden, N. J.; John E. Chrietzberg, Atlanta, Ga.; Thomas P. Fox, Philadelphia; Richard L. Hayes, Washington, D. C.; James P. Hollers, San Antonio, Texas; James R. Jensen, Minneapolis; Phelps J. Murphey, Dallas, Texas, and Harold W. Oppice, Chicago.

The Board approved the following as consultants to the Council on Dental Education:

Philip E. Blackerby, Jr., Battle Creek, Mich.; Leroy R. Boling, St. Louis; John C. Brauer, Chapel Hill, N. C.; Don W. Gullett, Toronto; William E. Hahn, Baltimore; Miss Evelyn R. Hannon, Portland, Ore.; Ralph MacDonald, Indianapolis; Harold W. Oppice, Chicago; Walter J. Pelton, Washington, D. C.; Leroy W. Peterson, St. Louis; Paul A. Slone, Washington, D. C.; Ray V. Smith, Iowa City; Reginald Sullens, Chicago; Miss Margaret E. Swanson, Chicago; George W. Teuscher, Chicago, and Mrs. Elma Troutman, LaPorte, Ind.

Consultants appointed for the Council on Dental Research were:

Wallace D. Armstrong, Minneapolis; Herbert D. Ayers, Jr., Flushing, N. Y.; Joseph L. Bernier, Washington, D. C.; J. Roy Blayney, Evanston, Ill.; James A. English, Washington, D. C.; Thomas J. Hill, Brecksville, Ohio; Harold C. Hodge, Rochester, N. Y.; Seymour J. Kreshover, Bethesda, Md.; Robert J. Nelsen, Rockville, Md.; Ralph W. Phillips, Indianapolis; Albert G. Richards, Ann Arbor, Mich.; Reidar F. Sognnaes, Boston; Kenneth H. Strader, Toledo; Carl J. Witkop, Jr., Bethesda, Md.; Wendell L. Wylie, San Francisco, and Seymour H. Yale, Chicago.

Approved as consultants for the Council on Dental Therapeutics were:

N. W. Chilton, Trenton, N. J.; Miss Mary C. Crowley, Ann Arbor, Mich.; Edward J. Driscoll, Bethesda, Md.; Harrison Flippin, Philadelphia; Count Gibson, Jr., Boston; Stanley C. Harris, Chicago; James R. Hayward, Ann Arbor, Mich.; Walter Hess, Washington, D. C.; Niels B. Jorgenson, Loma Linda, Calif.; Irvin Kerlan, Washington, D. C.; Leonard M. Monheim, Pittsburgh; Max Sadove, Chicago, and Ned B. Williams, Philadelphia.

Paul W. Zillmann, Buffalo, was appointed consultant to the Council on Insurance, and William F. Frederick, New York City, and Don W. Gullett, Toronto, were named to the Council on Dental Trade and Laboratory Relations.

The Board approved the following as consultants to the Council on Hospital Dental Service: Joseph R. Anderson and Kenneth B. Babcock, both of Chicago, and Edward C. Thompson, Urbana, Ill., and Leland E. Weyer, Washington, D. C.

Appointed to serve as consultants to the Council of National Board of Dental Examiners were:

Alton K. Fisher, Iowa City; Walter Hess, Washington, D. C.; Marjorie Houston, Chi-

cago; William B. Martin, Denver; Norman A. Moore, Kansas City, Mo.; Marcus D. Murphey, Houston; Ralph W. Phillips, Indianapolis; Richard Rabe, Des Moines; Rene Rochon, Detroit; Theodor Rosebury, St. Louis; Philip L. Schwartz, New Brunswick, N. J.; Lewis W. Thom, Minneapolis, and H. Henry Weisengreen, San Francisco.

ALL MEMBERS, GUESTS INVITED TO OPENING MEETING IN L. A.

For the second successive year the American Dental Association will begin its annual session with an opening meeting to which all members of the Association and their guests are invited.

The inauguration of the 1960 annual session in Los Angeles is the opening meeting to be held at 9:30 A.M. Monday, October 17, in the Pacific Ballroom of the Statler Hilton Hotel. President Paul H. Jeserich will officiate. John B. Wilson, chairman of the General Committee on Local Arrangements, will extend greetings, and welcoming speeches will be made by Mr. John S. Gibson, Jr., president of the City Council of Los Angeles, and Governor Edmund G. Brown. Officers and trustees of the American Dental Association will be introduced.

The main address will be delivered by Dr. Lee A. DuBridge, physicist and president of the California Institute of Technology. He will speak on "An Introduction to the Age of Space."

At 1:00 P.M., October 17, the House of Delegates will convene for its annual business session.

ATTORNEY TO JOIN STAFF OF ASSOCIATION COUNCIL

Mr. John P. Noone is scheduled to join the Association staff October 3 as secretary of the Council on Dental Trade and Laboratory Relations. He also will serve as House Counsel of the Association.

A native of Chicago, Mr. Noone was graduated from Loyola University Law School and served four years with the United States Army during World War II.

He has been associate attorney with the law firm of Heineke and Conklin; contract, real estate and trial attorney for the North Central Division of the United States Army Corps of Engineers, and general attorney for Beatrice Foods Company.

Mr. Noone is a member of the Chicago Bar Association and the Chicago Association of Corporate Attorneys.

FIRST CONFERENCE ON GROUP INSURANCE PROGRAMS HELD

The Association's Council on Insurance held its first Conference on Professional Association Group Insurance Programs September 9 and 10 at the Central Office. Included in the 68 persons participating were 28 members of constituent society insurance committees, nine lay consultants, four representatives from the federal dental services, and 12 from the insurance industry.

Several types of insurance appropriate to group underwriting were discussed and analyzed, with particular emphasis accorded to accident and health, professional liability and major medical expense insurance. The results of the 1960 Group Insurance Survey conducted by the Council were reviewed and the relationship between programs sponsored by the Association and those offered through constituent and component societies was explored.

At the close of the conference two motions were adopted: that at least one more conference be held in the near future, and that the Council attempt to set up a library of materials which describe the group insurance programs sponsored by constituent societies.

SECOND CONFERENCE ATTACKS SPECIALIZATION PROBLEMS

Representatives of 33 interested groups met September 7 and 8 with the members and staff of the Association's Council on Dental Education and the consultants

to the Council's Committee on Dental Specialties for the second conference on dental specialties and specialization. The sessions were held at the Central Office, with about 70 in attendance.

Raymond J. Nagle, dean, College of Dentistry, New York University, and chairman of the Council's Committee on Dental Specialties, presided. Dr. Nagle reminded the participants that the profession was faced with the grave danger of oversegmentation and that all actions taken by the Association on the subject affect the future of the dental profession and the scope of dental practice.

Various aspects of the subject were discussed by Paul H. Jeserich, president of the American Dental Association; Harvey S. Huxtable, chairman of the Council on Dental Education; Harold Oppice, past chairman of the Council and consultant to the Council's Committee on Dental Specialties; Leslie M. FitzGerald, vice-chairman of the Council and member of the Council's Committee on Dental Specialties; Harold Hillenbrand, Association secretary; Philip Blackerby, Jr., director, Division of Dentistry, W. K. Kellogg Foundation, and consultant to the Council's Committee on Dental Specialties; Mr. Bernard J. Conway, assistant secretary for legal affairs; Mr. Hal M. Christensen, secretary of the Council on Legislation, and Shailer Peterson, assistant secretary for educational affairs and secretary, Council on Dental Education. In addition to the papers presented, open discussion on all matters was conducted, with Dr. Oppice serving as moderator.

It was agreed that the drafting of definitions of specialty groups was of vital importance, since the Council on Dental Education and the House of Delegates cannot set up areas of practice without definitions of the various specialties and areas of practice. Dr. Hillenbrand explained the difficulties that are encountered with the fabrication of definitions and presented the philosophy that the important element is for each group to have an accurate image of its own function and responsibility.

Proposals for changes in the Association's *Principles of Ethics* which the Judicial Council has submitted to the House of Delegates for action at the 1960 annual session were explained by Mr. Conway. In substance, these changes would eliminate the distinction between a limitation of practice announcement and a specialty announcement and confine such announcements to those areas of dental practice for which there is a certifying board approved by the American Dental Association. Mr. Christensen stated that changes in the number of Association-recognized special areas of dental practice would not supersede state laws.

The need for existing certifying boards to define and delineate their own scope of interest, concern, and responsibility was emphasized by Dr. Peterson. He also said that boards must recognize that their scope might change from time to time and new subareas of dental practice might be added.

There was opposition from some of the members of the conference to the Council's proposal to ask the House of Delegates to continue the moratorium on the recognition of new specialties for another year. Proposals for possible regroupings of special areas of dental practice differing from the seven currently recognized by the Association were explained by Dr. Blackerby. The conference was opposed to the groupings as a solution to the specialty problem at the present time.

Dr. Hillenbrand announced that there would be a special Reference Committee on dental specialties during the annual session at Los Angeles, October 17-20.

MICHIGAN LICENSE NO. 1 TO SHAILER PETERSON

Shailer Peterson, secretary of the Association's Council on Dental Education, has been given Specialty License no. 1 in the

field of dental education by the Michigan State Board of Dentistry.

The Board announced that it wished to honor Dr. Peterson in this way because of "his dedicated efforts to improve dental education."

USE OF DENTAL ASSISTANTS SUBJECT OF CONFERENCE

Methods of bringing about important and needed changes in the approach to teaching dental students how to make effective use of dental assistants was the subject of a conference held September 13-15 at the Central Office and at the American Hospital Association building in Chicago. The conference was sponsored jointly by the Council on Dental Education and the American Association of Dental Schools. Approximately 140 persons attended the conference, made possible by a grant from the National Institutes of Health.

Reports were given on pilot study programs in ten dental schools which were set up to give students direct training and experience in the use of dental assistants. The first day's moderator, Philip Blackerby, associate director, W. K. Kellogg Foundation, Battle Creek, Mich., sum-

George W. Teuscher, top left, was the moderator of the first day of the Conference on Utilization and Training of Dental Assistants, sponsored by the Association's Council on Dental Education and the American Association of Dental Schools. The first day's session was held at the Central Office, with the next two days' meetings held at the American Hospital Association building in Chicago, September 13-15. Lower picture is of members of the planning committee: (from left) Joseph L. Champagne, Mr. Reginald H. Sullens, Walter E. Dundon, Miss Edna Zedaker, Shailer Peterson, Edward Forrest, Mrs. Ruth Giblin, Mr. Ben F. Miller III, John C. Brauer.

marized the results of the conference as follows:

1. The conferees support and affirm the views of the Council on Dental Education and the American Association of Dental Schools that as soon as practicable, all dental schools should initiate programs which give dental students direct training and experience in the use of dental assistants and further, that similar programs on utilization of the dental hygienist and the dental laboratory technicians also be planned and undertaken as rapidly as is practicable.

2. The conferees support and affirm principles adopted by the Council on Dental Education as expressed in the "Requirements for the Approval of Education Programs for Dental Assistants" and the "Requirements for the Approval of a Certification Board for Dental Assistants" and further, affirm the belief that there is a present and continuing need to increase the number of formal education programs for dental assistants which meet minimum education standards as approved by the American Dental Association.

3. The conferees affirm in principle the utilization of federal funds in the development of experimental programs to teach dental students the effective use of auxiliary personnel and further, the conferees urge that these funds be put to immediate use in furthering the experimentation initiated in the ten pilot study programs.

4. The conferees affirm and support the Council on Dental Education and the Board of Trustees in the following resolutions that are to be presented for consideration by the 1960 House of Delegates of the American Dental Association:

Resolved, that the Council on Dental Education be requested to urge qualified educational institutions and agencies to undertake carefully designed programs of experimentation and research in the training of dental hygienists and dental assistants so that the profession may determine more precisely their individual roles as members of the dental health team and thus enlarge the dental profession's capacity for service to the people of this country.

Resolved, that in any research and experimental programs in the training of dental hygienists and dental assistants authorized by the preceding resolution, the Council on Dental Education be directed to review and approve the design and conduct of the programs with a view to their ultimate evaluation and to urge educational institutions, in developing these programs, to consult with the constituent dental society and the state board of dental examiners in order to insure that the research and experimental programs are consistent with the policies of the profession in the area and with the orderly development of any amendments which may be needed to existing statutes for dental practice.

Dr. Blackerby concluded his summary by saying the conferees believe that further conferences of this nature are desirable to help find ways of developing training programs for dental assistants throughout the nation, and to develop programs for training dental students and practitioners to use *other* kinds of auxiliary personnel effectively.

FIVE CHOSEN FOR SPECIALTY REFERENCE COMMITTEE

Because of the great interest in various problems related to specialties in dentistry, President Paul H. Jeserich has announced there will be a special Reference Committee on Dental Specialties for the 1960 annual session of the Association at Los Angeles. He has named the following to serve on the committee: Wilbur D. Johnston, chairman, New Haven, Conn.; David E. Hunn, Troy, N. Y.; Allen M. Ito, Honolulu, Hawaii; John W. Knutson, United States Public Health Service, Washington, D. C., and Carl J. Stark, Cleveland.

TECHNICIAN COURSE APPROVED AT SOUTHERN ILLINOIS U.

Accreditation to the dental laboratory technician program conducted at Southern Illinois University at Carbondale was given by a resolution passed by the Asso-

ciation's Council on Dental Education at a special meeting July 29 and 30.

Approval of the Southern Illinois program followed the first of three survey visits which, this year, the Council will make to dental laboratory technician schools. During the 1960 annual session, the Council will evaluate the dental laboratory technician program conducted at the University of Southern California at Los Angeles Extension Division and, later this year, the program conducted at New York Community College, Brooklyn.

Dean W. H. Allen of the School of Dentistry at Meharry Medical College announces that institution's decision to discontinue its dental laboratory technician program. An insufficient number of applicants is the reason for the discontinuance.

To date the Council on Dental Education has approved four dental laboratory technician schools: School for Dental Laboratory Technicians, University Extension Dental Program, University of California (L. A.); Vocational Technical Institute, Southern Illinois University; New York City Community College of Applied Arts and Sciences; Division of Dental Laboratory Technology, Ohio State University.

Recently, the Council has received information indicating that development of new technician training programs are in progress at Durham, N. C.; Austin, Texas, and San Francisco. In addition to these schools now under development, the Council also is informed that dental laboratory technician programs are being considered and under discussion in Michigan, Ohio and Massachusetts.

DENTISTS CAN SAVE BY ORDERING DIRECTORY NOW

The 1961 edition of the American Dental Directory is now available and can be purchased for $12.50 if it is ordered before October 31. After that date the price becomes $15. Shipments will be made on January 1, 1961. Also available from now to October 31 is a durable hard cover edition at $18.50. This edition will not be available after that date. Requests should be sent to the Order Department, Central Office.

COUNCIL ASKS DENTISTS TO SEND IN LABORATORY ADS

The Council on Dental Trade and Laboratory Relations again reminds members of the Association that one of its continuing projects is a study of the advertising in public media of dental laboratories and mail order denture firms.

Dentists are urged to continue to clip any such ads they may see in newspapers and magazines. These clippings, together with the names and dates of the periodicals in which they appear, should be sent directly to the Council at the Central Office, 222 E. Superior St., Chicago 11.

CAR CARDS, POSTERS CAN BE ORDERED FROM BUREAU

A number of special aids will be available for the 1961 National Children's Dental Health Week, according to Mr. Perry J. Sandell, director of the Bureau of Dental Health Education. Mr. Sandell urged all dental societies to make their plans and request the material they need for the dental health week at an early date.

Outdoor advertising posters • Outdoor advertising posters, with the illustration used for the 1961 National Children's Dental Health Week poster, will be available, in full color. Size of the 24-sheet posters will be 234 by 104 inches.

If the total number of outdoor advertising posters ordered by all dental societies is between 500 and 999, the price will be $10.50 for each poster; if the total is more than 1,000, the price will be $9.00 for each poster.

Car cards • Car cards, to be used in buses and streetcars, will be available for the

first time. The photograph used for the 1961 poster also will appear on the car cards. The cards will be standard size, 11 by 28 inches. They will be in two colors.

On orders of 100 or fewer car cards, price will be 25 cents per card. Prices for larger quantities will be supplied on request.

Both outdoor advertising posters and car cards must be ordered by November 15. Only the number of posters and cards ordered by that date will be printed. Orders received after November 15 will not be filled.

The outdoor advertising posters can be printed only if the total number ordered is at least 500; the car cards can be printed only if the total number ordered is at least 5,000.

Miniature NCDHW posters • All dentists are encouraged to enclose the full-color miniature dental health week posters with their February statements. The posters are excellent as handouts for school children. There is a brief dental health message on the back.

Prices are: (100 to 499 posters) $0.75 per 100; (500 to 999) $0.60 per 100; (1,000 to 4,999) $5.50 per 1,000; (5,000 and over) $5.00 per 1,000.

Television feature programs • Enclosed in the dental health week program planning kit is a list of approximately 100 television stations to which programs, with slides and scripts to be read by local announcers, will be sent in January. The slides and scripts will be sent without charge, on request to the Bureau of Dental Health Education, to dental societies in areas not covered by these stations. The two 4½ minute programs are a joint project of the American Dental Association, Television Features Co. and Encyclopaedia Britannica.

Titles of the two programs are: "What's Your Face Value?" and "Take It From the Top."

Car cards in two colors and outdoor advertising, standard size (20 by 9½ inches) and miniature posters in full color will be available for the 1961 National Children's Dental Health Week.

Radio transcriptions • Transcriptions of four 14½ minute radio programs are available on two 33 1/3 rpm records.

Each of the four programs may be played on only one radio station and only once in any one community. However, they may be used without restriction for schools, service clubs, P.T.A.'s and similar groups.

The records may be purchased for $4.50 each; rental charge for a two-week period is $1.50 for the two records.

Titles are "Freddy's Story" (deciduous teeth), "The Case of Warren Kirby" (orthodontics), "Don't Forget Those Eskimos" (diet and other aspects of dental health) and "The Shortest of Stories" (value of the smile).

A transcription with ten 15-second and ten 30-second radio spot announcements is available on free loan. This record may be purchased for $4.50.

Two new dental health films • Two new color films, "Matter of Choice" (28½ minutes) and "Laurie Learns a Secret" (14½ minutes), have been produced by the American Dental Association.

These films may be rented for $3.50 each. Purchase prices will be sent on request.

Other materials • Also available are program planning kits, which are intended only for the chairman of each local planning committee, and 20 by 9½ inch post-

ers in full color. There is no charge for kits or posters, but it is likely that supplies of both will be exhausted by January 1.

Dental Societies

The First District Dental Society of New York, largest component society of the American Dental Association, is using this emblem to publicize the celebrating of its Centennial anniversary. Year-long activities will culminate with a banquet November 11 at the Hotel Pierre. The Hon. William O. Douglas, Associate Justice of the United States Supreme Court, will speak, and Percy T. Phillips, immediate past president of the Association, will be the master of ceremonies.

NEW YORK SOCIETY TO HAIL CONTRIBUTORS TO DENTISTRY

A program of awards to dentists and laymen who have contributed significantly to scientific dental progress and public service has been announced by M. Joel Freedman, chairman of the Centennial Award Committee of the First District Dental Society of New York.

Certificates of Appreciation will be awarded to individuals, groups and institutions for outstanding contributions to the field of dentistry, and for other distinguished services in the field of dental health education.

Presentation will be made at the centennial banquet to be held November 11 at the Hotel Pierre in New York, which will climax the year-long celebration of the one hundredth anniversary of the Dental Society of the State of New York.

L. M. ANDERSON HONORED BY FLORIDA DENTAL SOCIETY

At its annual meeting at Miami Beach in May, the president of the Florida State Dental Society, Alvin D. Farver, called to the rostrum before the society's General Assembly Mr. L. M. (Billy) Anderson, Jr., president of the L. M. Anderson Dental Supply Company of Tampa, to recognize him and his firm for the outstanding leadership and contribution being given to the Fund for Dental Education, Inc. The citation also included recognition of Mr. Anderson's acceptance of the responsibility of the chairmanship of the national campaign for the solicitation of funds from the members of the American Dental Trade Association for the Fund.

MARYLAND DENTAL SOCIETY AIDS CHILEAN COLLEAGUES

The Association's Council on International Relations has received news of the donation of $100 to the American Red Cross for the purchase of dental supplies and equipment to be sent to Chilean dentists in the areas of that country ravaged by earthquakes. This gift was from the Maryland State Dental Association.

Constituent societies and individual dentists throughout the country have responded to the appeal for help for the stricken dentists of Chile. Donations, either of money or of supplies and equipment, can be made through the Red Cross in Washington, D. C., office of Mr. George Smith, or directly to M. E. Moreno, M. Cousino 82, Of. 1301, Santiago, Chile.

Among the estimated five million persons left homeless and without food,

clothing and medical supplies, were about 650 dentists whose offices and equipment were likewise destroyed.

MAINE DELEGATES TO ANNUAL SESSION NAMED

Received too late for inclusion on the lists of delegates published in the August issue of THE JOURNAL were the names of those chosen by the Maine Dental Society. They are Alva S. Appleby, Skowhegan, Edward W. Peaslee, Augusta, and Parker Mann, Auburn. Alternates are Henry H. Grant, Portland, Frank P. Gilley, Bangor, and William F. Kierstead, Waterville.

COLORADO SOCIETY CITED FOR DENTAL HISTORY

One of the 59 awards of merit granted by the American Association for State and Local History was given to the Colorado State Dental Association for compiling a history of dentistry in Colorado.

After a lapse of 40 years, the Utah State Dental Association again has a Dr. Petty for president. William H. Petty, left, president in 1919-20, is shown presenting the president's plaque to his son, Russell B. Petty, president for the 1959-60 term. Tradition was waived, at the annual banquet in honor of the members' wives in April, to allow the senior Dr. Petty, rather than the outgoing president, to make the presentation to his son.

Public Health

EXAMS SCHEDULED FOR DENTAL OFFICERS IN U.S.P.H.S. CORPS

Competitive examinations for appointment of dentists as officers in the Regular Corps of the United States Public Health Service Commissioned Corps will be held throughout the country on January 31, and February 1, 2 and 3, 1961. Appointments will be for Assistant Dental Surgeon and Senior Assistant Dental Surgeon, equivalent to Navy ranks of Lieutenant (j.g.) and Lieutenant, respectively.

Application forms can be obtained by writing to the Surgeon General, United States Public Health Service (P), Washington 25, D. C. Completed application forms must be received no later than December 2.

ORTHODONTIST NAMED TO KENTUCKY HEALTH BOARD

John A. Atkinson, Louisville, Ky., has been named to the State Board of Health. He is the first dentist ever to become a member of the board.

Dr. Atkinson, an orthodontist, was named by Gov. Bert Combs from a list of three dentists proposed by the Kentucky Dental Association. A dental member on the State board was authorized by an act of the 1960 General Assembly. The Assembly also authorized each County Health Board, with the exception of the Louisville-Jefferson County Health Board, to add a dentist. In all, 107 dentists have been named to county health units in Kentucky.

Dr. Atkinson has been president of the Kentucky Dental Association.

National Defense

ASSOCIATION PERSONNEL AT NAVY BRIEFING CONFERENCE

Representatives of the American Dental Association met recently in the Navy's Bureau of Medicine and Surgery with Rear Admiral B. W. Hogan, MC, USN, Surgeon General, Rear Admiral C. W. Schantz, DC, USN, Assistant Chief of the Bureau of Medicine and Surgery (Dentistry), and members of the Dental Division staff to discuss matters of common interest.

Among the American Dental Association representatives who attended the briefing conference were Charles H. Patton, president-elect; T. F. Powers, chairman of the Council on Federal Dental Services; C. W. Camalier, assistant secretary and director of the Association's Washington office, and P. K. Musselman, Fourth District Trustee. Dr. Patton is an honorary consultant to the Surgeon General of the Navy.

AIR FORCE UPS TITLE OF CHIEF DENTAL OFFICER

Since August 1 the title of the chief dental officer of the United States Air Force has been Assistant Surgeon General for Dental Services. Formerly it was Assistant for Dental Services. The change

Seen on the steps of the Navy's Bureau of Medicine and Surgery, Washington, D. C., are: front row (left to right) Rear Admiral C. C. DeFord, Thomas F. Powers, Paul K. Musselman, Charles H. Patton, C. Willard Camalier and Rear Admiral C. W. Schantz; second row, Captain R. S. Snyder, Captain A. R. Frechette, Captain J. T. Ashwell, Captain N. J. Overton and Captain H. J. Wunderlich; third row, Captain M. L. Parker, Captain W. R. Stanmeyer and Captain J. P. Arthur.

follows a promise on the part of Air Force Secretary Dudley C. Sharp to give "full consideration" to a letter written by Thomas F. Powers, chairman of the Association's Council on Federal Dental Services, protesting the unfavorable position of the Air Force Dental Service as compared with those of the other branches of our Armed Forces. One of the matters touched upon by Dr. Powers in his letter was the then "nondescript" title of the chief dental officer.

In January 1959, Brig. Gen. James S. Cathroe, present Assistant Surgeon General for Dental Services, was promoted to the temporary rank of Major General, thus placing the ranking officer in the Air Force Dental Corps on a par with those of the Army and Navy. The Association has urged that two star rank be established by legislation to insure the continuation of this parity.

Still to be remedied are many points of disparity in the Air Force dental services mentioned by Dr. Powers in this letter to Secretary Sharp including "The absence of professional independence throughout the dental service [which] seriously militates against the successful maintenance of an attractive and effective career dental service.

MILITARY SURGEONS PLAN 67TH ANNUAL CONVENTION

Over 2,000 American and international dentists, physicians, veterinarians, nurses and medical specialist delegates are expected to attend the sixty-seventh annual convention of the Association of Military Surgeons October 30 at the Mayflower Hotel, Washington, D. C.

The theme of the three-day meeting is the military role in medical progress. In addition to many scientific lectures and discussions, Dr. Manfred S. Guttmacher, Chief Medical Officer of the Medical Service of the Supreme Bench of Baltimore, will deliver the William C. Porter Lecture, and there will be a panel discussion on man and the radiation hazard.

Reserve officers attending the meeting may register for credit points. There is no registration fee and nonmembers are invited.

MAURICE C. HARLAN PROMOTED TO BRIGADIER GENERAL

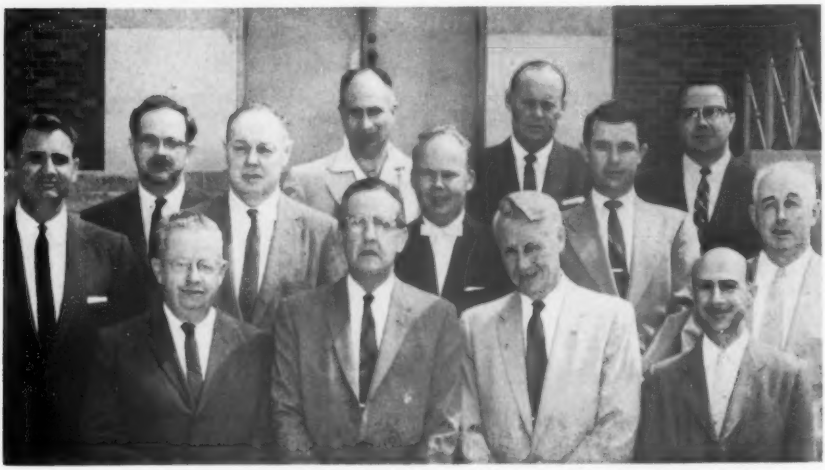
Deputy Assistant Surgeon General for the Air Force Dental Services, Maurice C. Harlan, has been promoted to Brigadier General effective August 27. This marks the first time in two years that the Air Force Dental Service has had two officers at flag grade level. This situation, however, will exist only until October 1 when Major General James S. Cathroe, chief of the Dental Services, is due to retire.

Research

MEETING ON SPECIFICATIONS FOR DENTAL MATERIALS

In 1953 the Council on Dental Research sought the assistance of the Dental Materials Group of the International Association for Dental Research on both the formulation of new specifications and the revision of existing specifications for dental materials.

On July 18 of this year, the Specifications Committee, whose duty it is to carry out this program for the Dental Materials Group, met at the National Bureau of Standards to consider the progress of the revisions currently under way on Specifications No. 1, Amalgam Alloy; No. 5, Inlay Casting Gold Alloys; No. 7, Wrought Gold Wire Alloy; No. 11, Hydrocolloidal Impression Material—Agar Type. Also under consideration at the meeting were new specifications being formulated for alginate type, hydrocolloidal impression material; steel and carbide burs; denture relining resin; zinc oxide-eugenol impression paste; diamond mounted instruments, radiographic film.



Framers of the Association's specifications for dental materials were pictured at a recent meeting in Washington, D. C. They are: front row (left to right), Mr. Kenneth H. Strader, Mr. Walter S. Crowell, George C. Paffenbarger, Alphonse F. Forziati; back row, Ralph W. Phillips, George Dickson, Herbert D. Ayers, Jr., Gerhard M. Brauer, John W. Stanford, George C. Rader, Duane F. Taylor, R. L. Bowen and William T. Sweeney.

The members of the committee and secretaries of the subcommittees who assist in this program are: Mr. Kenneth H. Strader (member), sales engineer, Glaskyd, Inc.; Mr. Walter S. Crowell (chairman), supervising chemical engineer, The S. S. White Dental Manufacturing Company, Philadelphia; George C. Paffenbarger (secretary), senior research associate, American Dental Association Research Division, National Bureau of Standards; Alphonse F. Forziati, research associate, American Dental Association Research Division, National Bureau of Standards (secretary of the subcommittee on dental radiographic film); Ralph W. Phillips (member), head, department of dental materials, School of Dentistry, Indiana University; George Dickson, physicist, Dental Research Section, National Bureau of Standards (secretary of the subcommittee on casting investments); Herbert D. Ayers, Jr. (member), assistant clinical professor of dentistry, School of Dental and Oral Surgery, Faculty of Medicine, Columbia University; Gerhard M. Brauer, chemist, Dental Research Section, National Bureau of Standards (secretary of the subcommittee on denture relining resins); John W. Stanford, research associate, American Dental Association Research Division, National Bureau of Standards (secretary of the subcommittee on diamond mounted instruments); George C. Rader (consultant), head, Planning and Analysis Branch, Dental Division, Bureau of Medicine and Surgery, Department of the Navy; Mr. Duane F. Taylor, metallurgist, Dental Research Division, National Bureau of Standards (secretary of the subcommittee on burs); R. L. Bowen, research associate, American Dental Association Research Division, National Bureau of Standards (secretary of the subcommittee on hydrocolloidal impression materials), and William T. Sweeney (member), chief, Dental Research Section, National Bureau of Standards.

Also (not present when picture was

taken) P. M. Margetis (consultant), chief, Dental Research Branch, U. S. Army Medical Research and Development Command; Mr. Denton L. Smith, director of research, the J. M. Ney Company (secretary of subcommittees on casting gold alloy and wrought gold wire alloy); H. J. Caul, research associate, American Dental Association Research Division, National Bureau of Standards (secretary of the subcommittee on zinc oxide-eugenol impression paste).

Dental Education

RESEARCH AND TEACHING TRAINEESHIPS AT U. OF P.

Research and teaching traineeships in the basic sciences, in periodontology and in the comprehensive treatment and rehabilitation of the cleft palate patient are available at the School of Dentistry, University of Pennsylvania.

All traineeships are supported by the United States Public Health Service. Annual stipends are from $4,500 up depending on the qualifications and needs of the successful candidates. Inquiries concerning the basic science and cleft palate traineeships can be sent to the chairman of the Committee on Traineeships and Fellowships, University of Pennsylvania, School of Dentistry, 4001 Spruce St., Philadelphia 4. Inquiries about the traineeships in periodontology can be sent to the dean of the Graduate School of Medicine, 237 Medical Laboratories, University of Pennsylvania, Philadelphia 4.

ORAL SURGERY INTERNSHIP OPEN IN KNOXVILLE, TENN.

A one-year internship in oral surgery, approved by the Council on Dental Education of the American Dental Association, is being offered at the University of Tennessee Memorial Research Center and Hospital, Knoxville.

The department (dentistry and oral surgery) is affiliated with the Cleft Palate Clinic at the East Tennessee Children's Hospital and the intern participates in this clinic as part of his training.

The post carries full maintenance and salary of $300 per month. Inquiries should be addressed to the medical director of the hospital, Alcoa Highway, Knoxville, Tenn.

TEACHER TRAINING IN ORAL BIOLOGY AT LOYOLA (CHICAGO)

Loyola University School of Dentistry, the Chicago College of Dental Surgery, is offering a research and teacher training program in oral biology.

The course, under a teacher training grant from the National Institutes of Health, is designed for candidates wanting a teacher's career in basic sciences or in clinical subjects. The stipends are up to $5,000 per year, and the program can lead to an advanced degree.

Further information can be obtained by writing to Dr. Harry Sicher, Loyola University School of Dentistry, 1757 W. Harrison St., Chicago 12.

MANY POSTGRADUATE COURSES LISTED FOR FALL, WINTER

Alabama • The University of Alabama School of Dentistry has scheduled two refresher courses for the month of December: oral cancer, December 3 and 4, Leonard Robinson, and preventive orthodontics, December 10-12, Sidney B. Finn and H. Perry Hitchcock. Further information can be obtained from the director of the refresher course program at the school. The address is 1919 - 7th Ave. S., Birmingham 3.

Boston • The department of stomatology, division of graduate studies, School of Medicine, Boston University, and the Massachusetts Memorial Hospitals announce the following postgraduate courses:

Periodontal pathology, January 16-21, Henry M. Goldman and Jack Bloom; oral

pathology for oral surgeons, March 6-10, Jack Bloom, Kurt Thoma, Henry M. Goldman and staff; apicoectomy surgical endodontic procedures, April 10-14, Herbert Schilder; periodontal therapy, April 24-29, Henry M. Goldman, Bernard S. Chaikin, Gerald M. Kramer, William Pendergast, Jack Bloom and associates; advanced course in periodontal therapy, April 24-29, Henry M. Goldman, Bernard S. Chaikin, Gerald M. Kramer, William Pendergast and associates; full mouth reconstruction, May 15-19, Leo Talkov, David J. Baraban, Henry M. Goldman, Bernard S. Chaikin, Gerald M. Kramer and J. David Kohn; surgical procedures in periodontal therapy, May 22-26, Lewis Fox and associates.

Week-end refresher courses scheduled between now and the end of the year are: pulp and periapical pathology, October 28 and 29, I. B. Bender and Samuel Seltzer; esthetics in restorative dentistry, November 4 and 5, Charles L. Pincus; removable partial dentures, November 11 and 12, Louis Blatterfein, and comprehensive review of periodontal surgical procedures, November 18 and 19, Jack Alloy, Jack Bloom, D. Walter Cohen, Robert Gottsegen and Gerald M. Kramer.

Further information can be obtained by writing to the director of postgraduate courses of the department of stomatology, Massachusetts Memorial Hospitals, 750 Harrison Ave., Boston 18.

California • Two special courses in October are being offered by the School of Dentistry of the University of California at San Francisco. They are diagnostic principles for the identification of oral diseases, October 15, Joseph L. Bernier, and oral roentgenology for dental assistants, October 21-23, Gordon M. Fitzgerald. Both will be given at the San Francisco Medical Center, Third and Parnassus Aves.

Other courses listed at this school include: introduction to oral rehabilitation, October 29; operative dentistry and its importance in general practice, November 10; practical amalgam operations (a participation course), November 11 and 12, and habilitation of the cleft palate patient, November 16-18.

Michael Reese Hospital • For the third consecutive year Michael Reese Hospital and Medical Center, 29th St. and Ellis Ave., Chicago 16, is presenting "The Medical Laboratory in Clinical Dentistry." This unusual course will be held February 9 and 10 immediately following the Chicago Midwinter Meeting. Emanuel Cheraskin will present the course and Arthur Elfenbaum will moderate the discussions. A printed textbook, "Laboratory Aids in Stomatologic Diagnosis" by Dr. Cheraskin, will be included in the course for which the fee is $50. Further information can be obtained by writing to the dental department of the hospital.

Nebraska • Tuition and registration is $50 for each of the six courses to be held at the University of Nebraska during the 1960-61 season. They are: occlusal equilibration procedures, October 13-15; periodontal therapy, October 31 and November 1; the growing child—physical and dental, November 10 and 11; pedodontic appliances, January 30 and 31; business management and personal financial affairs, February 20-22; dental drugs in action, March 6 and 7.

New York • The First District Dental Society is sponsoring six postgraduate courses to be held prior to and after the Greater New York Dental Meeting. They are: oral dynamics, December 1-3, John T. McSweeney; endodontics, December 1-3, E. Alan Lieban; analgesia, December 1-3, Harry Langa; a survey of the temporomandibular joint, December 1-3, Arthur S. Freese, Arthur Edward Kahn, Joseph J. Martini and Paul Scheman; preparation of teeth for jackets for abutment purposes, December 12-14, I. Franklin Miller, and a comprehensive survey of the acrylics in dentistry, December 15 and 16, A. Milton Bell. Further information can be obtained from the society at the Hotel Statler Hilton, New York 1.

Temple • The following graduate and postgraduate courses are scheduled at Temple University School of Dentistry: clinical endodontics, October 31-November 5, Leonard Parris and associates; high speed in operative dentistry, December 7 and March 1, Carlos Weil and Charles A. Nagle, Jr.; implant dentures, January 9-13, Aaron Gershkoff and Norman I. Goldberg; anatomy—head and neck dissection, Wednesdays from February 1 to May 17, Richard M. Snodgrasse; advanced fixed prosthesis, February 6-11, George Straussberg; present day periodontal practice, Tuesdays February 14 through April 18, Jacoby T. Rothner, Irving Glickman, Bernard B. Saturen, Neal W. Chilton; practice administration, February 18, Jay H. Eshleman; periodontal prosthesis, February 20-24, Morton Amsterdam and D. Walter Cohen; electronic electrosurgery, March 3 and 4, Maurice J. Oringer; immediate surgical endodontics, March 6-11, Leonard Parris, Harold Rappaport and Robert Uchin; advanced surgical technics in periodontal therapy, March 25-29, Saul Schluger and Jack Alloy; complete den-

ture prosthesis, May 8-12, Bernard Jankelson; graduate orthodontics, September 7, Robert B. Hedges, S. Eugene Coben, Milton J. Lande, Theodore J. Stazeski, Ben J. Addiego and Allen C. Brader.

Further information can be obtained by writing to Louis Herman, Temple University School of Dentistry, 3223 N. Broad St., Philadelphia 40.

Tufts • The Tufts University School of Dental Medicine, 136 Harrison Ave., Boston 11, lists the following postgraduate courses: endodontics for the general practitioner, March 20-23, Arthur Pearson and staff; surgical management of skeletal deformities, May 8-10, John H. Hovell; orthodontic principles of interest to the general practitioner, Wednesdays from February 8 through April 5, Everett Shapiro, Ernest M. Mendeloff and Robert S. Fields; a special participation course in periodontology, April 24-28, Irving Glickman and staff; diagnosis and treatment of pain and other symptoms arising from temporomandibular joint disturbances; May 23 and 24, Harmon Shohet; surgical and prosthetic management of advanced periodontal disease, March 1 and 2, John Prichard; crown and bridge design and construction, February 15 and 16, Frank A. Eich; complete denture prosthesis, June 5-9, Irving R. Hardy and A. Albert Yurkstas.

Complete information can be obtained by writing to the director of the division of graduate and postgraduate studies.

Virginia • The Medical College of Virginia, School of Dentistry, will present the following courses: pedodontic workshop, November 3-5, William S. Kramer, Robert A. Senescu and Henry M. Wilbur; clinical occlusion, February 11-15, Arne G. Lauritzen; oral surgery, March 6-8, Elmer Bear and W. J. Longan; anatomy of the head and neck, March 13-17, Alton D. Brashear; complete denture prosthesis, March 20-24, M. M. DeVan; clinical photography, April 10, Mr. Melvin C. Shaffer and P. J. Modjeski. Details can be had by writing to H. T. Knighton, director of postgraduate instruction, School of Dentistry, Medical College of Virginia, Richmond.

Washington • Some of the courses that will be given at the University of Washington School of Dentistry at Seattle are: creating the illusion of natural teeth in the artificial denture, January 4 and 5, Roland D. Fisher; dental therapeutics and prescribing, January 14 and 15, James M. Dille, John D. Gehrig and John I. Ingle; pedodontics for the general practitioner and the specialist, February 6-8, William P. Humphrey and Thompson M. Lewis.

General

WILLIS A. SUTTON, EDUCATOR, DIES JULY 28 IN ATLANTA

Willis A. Sutton, Pd.D., LL.D., 81, former superintendent of Atlanta, Georgia, schools, who was widely known in educational and dental circles, died July 28 in Atlanta.

More than 35 years ago, Dr. Sutton pioneered a program of public health dentistry that became a model for schools over the nation. He was one of only three laymen ever to receive the Thomas P. Hinman Medal for outstanding service to the field of dentistry. It was his conviction that education begins with good health, and that sound teeth are mandatory to good health.

Not only did he hold many offices and receive numerous awards in the fields of education and the humanities, but he also was an honorary Fellow of the American College of Dentists and an honorary member of the American Dental Association.

TRENDLEY DEAN REPUDIATES ANTIFLUORIDATIONISTS

Advertisements claiming that H. Trendley Dean was forced to admit his claims for fluoridation were fallacious have been appearing in some newspapers throughout the country. They are published over the name of L. S. Stevens, chairman of the Ohio Pure Water Association.

Dr. Dean, former director of the National Institute of Dental Research and former secretary of the Association's Council on Dental Research, has termed it "a completely unjustified attack upon my professional reputation and my standing in the field of scientific research."

In a letter to Mrs. Stevens of Akron, Ohio, copies of which were sent to the editors of the newspapers which have published these advertisements, Dr. Dean continues:

> I have been shown an advertisement sponsored by the chairman, Ohio Pure Water Association, which appeared in the *Akron Beacon Journal* on Sunday, August 28, 1960. This advertisement claims that the testimony I presented before a master in chancery in the case of *Alice Shuringa, et al. v. City of Chicago,* repudiates the strong support I have always given to fluoridation of community water supplies. The advertisement also claims that other testimony of mine in 1955 shows that I admitted that I deliberately misrepresented the safety and effectiveness of fluoridation.
>
> There is no legitimate basis for these claims. I still strongly urge all communities to fluoridate their water supplies. The procedure is safe and of significant benefit in reducing dental decay. There is nothing in the testimony I gave in California in 1955 or in Chicago in 1960 which indicates otherwise.

SEMINAR ON STRESS PLANNED BY ROWE SMITH FOUNDATION

Stress will be the subject of the seventh annual seminar of the Rowe Smith Memorial Foundation to be held again this year at the Fly-n-Fish Lodge, Karnack, Texas.

The essayists will be Stewart Wolf, M.D., remembered for his talk on pain at the 1956 session, and James D. Hardy, Ph.D., who presently is engaged in research in aerospace medicine.

The seminar will be held December 2-5 and attendance is limited. Those interested can make application to attend to the Foundation at 501 State National Bank Building, Texarkana, Ark.

CALIFORNIA DENTAL SCHOOLS TO HOST GOLD FOIL MEETING

The American Academy of Gold Foil Operators will hold its annual meeting October 13-15 preceding the annual session of the American Dental Association.

The first day's session will be held at the School of Dentistry, College of Medical Evangelists, Loma Linda, Calif., and the final two days of meetings will be conducted at the School of Dentistry, University of Southern California, Los Angeles.

Chair and table clinics, panel discussions and essayists will comprise the program. All Association members are invited to attend. Details can be obtained by writing to Charles C. Latham, P. O. Box 266, Coronado 18, Calif.

ORAL SURGEONS TO CONFER ON GRADUATE EDUCATION

The American Society of Oral Surgeons will hold the third conference on graduate education in oral surgery November 28 in the auditorium of the American Hospital Association Building in Chicago. This date immediately precedes the advanced institute November 29-December 1 sponsored by the Council on Hospital Dental Service of the American Dental Association and the American Hospital Association.

The general theme of the conference will be the effective use of hospitals in advanced education. Speakers will include Frank H. O'Halloran, president of the American Society of Oral Surgeons, Edward C. Hinds, John G. Stapleton, M.D., James T. Howell, M.D., J. Edward Berk, M.D., Paul Nemir, Jr., M.D., Robert S. Myers, M.D., Claude S. LaDow, Morgan L. Allison, Col. Richard J. Burch, Merle L. Hale and William J. Lahey, M.D.

ORTHODONTIC SEMINAR TO BE HELD NOV. 6-9 AT PHOENIX

The University of Kansas City School of Dentistry will present an orthodontic seminar at the Camelback Inn, Phoenix, Ariz., November 6 through 9.

Principal speakers will include Oren A. Oliver, Joseph E. Johnson, Arnold E. Stoller, T. M. Graber, Hamilton Robinson and Victor Bowles.

All orthodontists and their wives are invited to attend; special arrangements will be made for graduate students. Applications for attendance can be sent to the postgraduate division of the school at 1108 E. Tenth St., Kansas City, Mo.

ORAL PATHOLOGY ARCHIVES AVAILABLE TO PROFESSION

Sets of unbound volumes of the *Archives of Clinical Oral Pathology* (1937-1940) are now available to members of the profession. The 1,425 pages of illustrated text of original communications relate to dental and oral, basic and clinical sciences.

Contents include clinical case reports, editorials, abstracts of oral pathology articles, historical data, and, of special importance, the *George B. Winter Memorial Issue*.

The set of four volumes is $10. Further information can be obtained by writing to The New York Institute of Clinical Oral Pathology, 101 East 79th St., New York 21.

ENDODONTICS GROUP TO MEET IN BEVERLY HILLS OCT. 15

An all-day scientific meeting will be held Saturday, October 15, at the Beverly Hills Hotel, Beverly Hills, Calif., prior to the annual session of the American Dental Association.

A symposium on the aspects of dental pain is scheduled for the forenoon, and after a luncheon seminar Harold A. Maxmen of Detroit will speak on the rationale of surgical intervention in endodontics including periapical pathology.

Attendance is limited to 200, and reservations may be made through Sanford Golden, program chairman, 1001 Gayley Ave., Los Angeles 24. Registration fee is $10.

MID-CONTINENT DENTAL CONGRESS NOV. 27-30

"1960—A New Decade for Learning" will be the theme of the nineteenth annual Mid-Continent Dental Congress to be held November 27-30 at the Chase Hotel, St. Louis. The congress is sponsored by the St. Louis Dental Society.

A special four hour course will be given by John L. Woehler on practice administration, entitled "Improve Dentistry Faster Without Increased Cost to the Patient." Other essayists include Ted Gordon, Lester Burket, George C. Stewart, Angelo D'Amico, Clinton C. Emmerson, Frank E. Beube, Ralph W. Phillips, John C. Versnel and Vincent R. Trapozzano.

Complete details of the program can be obtained by writing to the society at 8013 Maryland Ave., St. Louis 5.

UNIVERSITY PLANS IMPLANT DENTURE CLINIC OCT. 14-16

The University of California Extension Dental Program, in conjunction with the American Academy of Implant Dentures, will hold a three-day clinic on denture implants at 815 South Hill St., Los Angeles.

The clinic, scheduled from 9 A.M. to 4 P.M. each day, will include a closed circuit television presentation of denture implant operations on two patients.

Further information can be obtained from the office of the extension program, Room 211, 815 South Hill St., Los Angeles 14.

reports of councils and bureaus

Association testimony on construction funds for dental schools

COUNCIL ON LEGISLATION

On June 6, 1960, Lester Burket, Philadelphia, chairman of the Council on Dental Therapeutics, Francis Herz, San Francisco, vice-chairman of the Council on Legislation and Mr. Hal Christensen, secretary of the Council on Legislation, appeared before the Subcommittee on Health and Safety of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives, to present the American Dental Association's position on legislation to provide federal grant-in-aid funds to assist in the improvement and construction of dental and medical schools and to provide scholarships for dental and medical students.

The Association was joined by the American Association of Dental Schools, the American Medical Association, the American Association of Medical Colleges and other leading health organizations in endorsing the proposals to help meet the acute need for additional dental and medical teaching facilities.

The Association also testified in favor of a pending bill sponsored by the Administration to permit grants to schools for general research as well as for specific research projects.

The full text of the Association's prepared statement follows.

I am Francis Herz of San Francisco, where I am engaged in the general practice of dentistry. I am vice-chairman of the Council on Legislation of the American Dental Association. With me is Lester Burket, dean of the School of Dentistry, University of Pennsylvania, Philadelphia. We are here today to present the Association's position on H.R. 6906, H.R. 10255, H.R. 11651 and H.R. 10341, all of which are intended to meet certain basic needs in connection with dental and medical education.

The Association is particularly concerned with the critical need for funds to assist in the construction and equipping of new dental schools and the rehabilitation and expansion of existing schools.

As will be indicated in detail in a later part of this statement, unless affirmative action is taken now, population growth will continue to outrun available dental manpower by an increasing margin. Beginning now, significant increases in the number of dental graduates will be needed during the next

several years just to keep abreast of population growth. Additional dental teaching facilities must be constructed and existing facilities must be improved. For these purposes, substantial increases in both government and private funds are essential.

There is a need, too, for providing financial assistance to talented students who wish to pursue dentistry as a career. There is evidence that the comparatively high cost of obtaining a dental education is becoming more and more a deterrent to the attraction of needed qualified personnel to careers in dentistry. More governmental and private financial assistance is needed in this area.

There also is a need for the legislation to permit the dental schools and other research centers to devote a percentage of federal research grant funds to general research programs rather than exclusively to individual projects. This proposal to authorize so-called "institutional research grants" will allow even, well-balanced development of the research and research training programs.

Each of these matters willl be referred to in more detail by Dr. Burket.

The American Dental Association policy regarding federal grant-in-aid legislation has been presented to Congress on several occasions since 1949. In that year, the Association's House of Delegates adopted the following resolution:

"*Resolved*, that the American Dental Association approve the policy that Federal funds, with justification, might be appropriated in support of dental education programs, provided that such funds when appropriated should be accepted with the understanding that the Government shall not exercise any control over, or prescribe any requirements with respect to, the curriculum, teaching personnel, or administration of any school or the admission of applicants thereto."

The legislation under consideration by this committee is in keeping with this policy.

I would now like to have Dr. Burket present the remainder of the Association's testimony. Dr. Burket is dean of the School of Dentistry, University of Pennsylvania, and is chairman of the American Dental Association's Council on Dental Therapeutics. He is a doctor of medicine as well as a doctor of dentistry. He is well qualified by direct experience as a dental school administrator and by his wide knowledge of dental educational affairs to testify on the legislation before this committee.

DR. BURKET'S TESTIMONY

I appreciate this opportunity to present the American Dental Association's position on legislation designed to provide grant-in-aid assistance to dental, medical and public health education.

The fact that this legislation has been introduced demonstrates a recognition of the problems facing education in the health sciences. My statement will, of course, be confined to the viewpoint of dentistry and dental education.

All of the pending bills have been introduced, I am sure, with the knowledge that action is required now to assure adequate dental care in the years to come.

No guesswork is necessary to reach the conclusion that existing facilities and manpower cannot meet current needs, let alone the definitely projectable needs of the future. Here are some of the facts as reported by the Surgeon General's Consultant Group on Medical Education and confirmed by a recent study of a Committee of Consultants on Medical Research to the Senate Committee on Appropriations. According to these reports, between now and 1975, the country will need an equivalent of 22 new dental schools and will need to graduate 6,180 dental students each year—or to say it another way—there will be a need for twice as many graduates then as the present schools will have at commencement time this year in order to maintain the present ratio of dentists to population.

As stated by the Consultant Group referred to earlier, "To arrest the decline in the national ratio of dentists to population at its 1959 level will require that dental school training capacity be increased sufficiently to produce 6,180 annual graduates by 1975 or about 2,700 more than can now be expected." At the present time about 3,200 dentists are being graduated each year.

Leaders in the dental profession and many dental educators view these statistics with grave concern. For, in addition to greatly expanding population there is every reason to believe that the proportion of the population seeking dental care also will increase. Obviously, dental educational facilities must be expanded substantially to meet the known needs.

NEED FOR CONSTRUCTION FUNDS (H.R. 6906)

H.R. 6906, proposed by Representative Fogarty, would greatly aid the schools in expanding existing facilities and stimulate construction of several new schools.

In an effort to determine as precisely as possible the construction needs of the existing dental schools for the next five years and to secure a realistic estimate of the extent to which the schools would be in a position to

participate in a federal matching grant program, the Council on Dental Education conducted a survey of all of the dental schools in March 1959. In summary, the survey showed that the existing schools would plan to expand and improve their teaching and research facilities by about 104 million dollars during the next five years if sufficient funds could be made available. In addition, the schools indicated they were certain that the availability of a federal matching grant program would aid materially in the raising of funds from private sources for construction of teaching and research facilities. It was indicated definitely that the dental schools could undertake a construction and improvement program in excess of 100 million dollars if legislation such as H.R. 6906 were enacted.

Modernization and improvement of existing schools as indicated could be expected to result in the enrollment of an additional 485 dental students a year, 589 more dental hygiene students a year, and would enable the schools to expand or initiate programs for the training of graduate and postgraduate students and dental assistants. More specifically, from 1959 to 1963, 37 schools would plan to expand existing undergraduate programs, 33 schools would expand graduate programs, 32 schools would expand postgraduate programs. In addition, 11 schools have plans to expand existing dental hygiene schools, 16 schools plan to start new dental hygiene programs, 15 schools expect to start new dental assisting programs and 7 schools are contemplating establishment of programs for dental laboratory technicians.

In addition to this expansion of existing facilities, there are definite plans to establish two new dental schools within the next two years and reasonable assurance that an additional seven or eight schools will be put into operation within the next ten years. The two schools for which definite provisions have been made are in Kentucky and California. There has been serious discussion of the possibility of establishing dental schools in the following states: South Carolina, Oklahoma, New York, Connecticut, Colorado, Florida, Ohio and possibly in Utah. A federal matching grant program for construction of new teaching facilities will hasten the establishment of these schools and, in at least some of the cases, it will be the determining factor in whether construction is undertaken. If the ten-year provision for new construction were to be approved on a two thirds-one third basis, the seven or eight schools which now appear to be in the stage of serious study and planning would be in need of 45 to 50 million dollars depending on the size of the institution planned and other factors. This would mean then that new dental school construction which can be anticipated within the next ten years could be aided materially, and in some cases assured, by the provision of 45 to 50 million dollars within the ten-year periods proposed in H.R. 6906.

The American Dental Association believes, in summary, that the need for a program of the type envisioned in H.R. 6906 is acute and that this committee and the Congress should take favorable action thereon at the earliest possible date.

The Association suggests that the committee give consideration to specifying in the bill the portion of the total funds intended to be applied to assist in the construction and improvement of dental schools and suggests that approximately one third of the total amount could be well justified for this purpose. The Association also recommends that Section 803 of the bill be amended to permit grants up to $3,000,000 for dental schools as well as medical schools. There is ample evidence that dental school construction and improvement costs are as high or higher than such costs for medical schools.

In any event, the American Dental Association respectfully recommends that H.R. 6906 be given favorable consideration by this committee.

NEED FOR ASSISTANCE FOR STUDENTS (H.R. 10255, H.R. 11651)

While the needs for modernization of existing dental schools and the building of additional new schools are in themselves substantial and impressive, serious attention has also been given to the need to provide financial assistance to properly qualified and interested students.

High Cost of Dental Education • The cost of a dental education is higher than for any other profession requiring a comparable period of study. It is estimated that predental college studies cost about $2,000 per year, whereas dental school costs are approximately $3,000 to $4,000 per year. Thus, a dental education may range in cost to a student from $16,000 to $20,000 or more. In addition to the cost of formal education, a dental graduate must invest from $5,000 to $7,000 in equipment before he can expect to start a private practice.

Availability of Scholarship Funds • Only minimal student aid funds are available in a majority of the dental schools. These funds

encompass scholarship, fellowship and loan programs which vary in scope and volume from school to school. However, there are presently 13 dental schools which report no student aid funds of any type. Although exact figures of the total amount of available scholarship funds are not known, it is assumed that the aggregate sum of all forms of student aid funds would not exceed $100,000. Funds available to the schools from private sources have been steadily increasing; yet, it is recognized that student aid funds for all dental schools must be extensively increased in the coming years if dentistry is to continue to attract the qualified personnel it needs. As nearly as it can be determined now, about 40 per cent of the students are able to pay their own way, through personal savings, parental assistance, help from relatives and friends. For the remaining 60 per cent, more financial aid is needed.

Problems in Recruiting Dental Students • The profession is concerned over an apparent decline in the ratio of dental school applicants to available classroom spaces and for this reason the American Dental Association is inaugurating programs for the recruitment of students for careers in dentistry. Certainly one of the deterring factors working against dental recruitment is the serious financial sacrifice involved.

Moreover, all health professions including dentistry are compelled to compete with other attractive career pursuits having more glamour, equal or better economic incentives and quicker routes to financial reward.

However, it is reasonable to expect that there will be relatively more students seeking admission than are available at present and there will surely be an increasing need for both private and federal funds to enable dental schools to accept capacity enrollments without undue concern for economic factors which might bar many able and qualified students from seeking an education in this profession.

INSTITUTIONAL RESEARCH GRANTS (H.R. 10341)

The Association supports the proposal to permit institutional grants to be used for assisting dental schools and related institutions that are carrying on research in diverse scientific disciplines. Many institutions will welcome grants which may be applied to support basic programs on a general basis, without specific designation for any single purpose. Frequently situations arise which require the prompt purchase of additional equipment or supplies, the part-time employment of additional personnel, modification of laboratory arrangements and facilities, or travel to consult with specialists in other laboratories. These exigencies cannot always be budgeted for within the confines of one or several specific project budgets, but they may be important to every single project being conducted at the institution. Moreover, institutional grants would permit the initiation of a new project and the hiring of personnel at the discretion of the research director. In many cases this would avoid the delay necessitated by the administrative procedures involved in applying for and obtaining final activation of a specific research project grant. It would also permit pilot investigations to be started quickly and in investigative areas that may be difficult to delineate with sufficient clarity for a regular or "short-term" grant application but which may nevertheless turn out to be quite productive in the long run.

The Association believes the institutional grant authority will permit a desirable balancing in the research programs in this country's dental schools.

SUMMARY

The American Dental Association believes the need for a government grant-in-aid program for construction and improvement of dental schools has been amply demonstrated and urges enactment of H.R. 6906.

Likewise, the need for financial aid to dental students in the form of scholarships is an extremely worthwhile and needed program.

The American Dental Association wishes to commend Representative Fogarty for his recognition of the acute problems facing the health professions as evidenced by his introduction of H.R. 6906 and H.R. 10255 and urges favorable consideration of this legislation by the committee. The Association also recommends enactment of H.R. 10341.

The 1959 survey of dental practice
VI. Use of high speed equipment; prescriptions written

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Nonsalaried dentists participating in the survey were asked "At what speed do you normally operate your handpiece?" Responses were classified as follows: low speed, under 10,000 rpm; intermediate speed, 10,000 to 29,999; high speed, 30,000 to 99,999, and super speed, 100,000 and over. One of every seven respondents gave a range of speeds involving two of these categories.

Only 17.2 per cent of the nonsalaried dentists responding used low speed drilling equipment exclusively (Table 41.) This figure varied greatly with the age of the dentist, from 3.9 per cent of the dentists under 30 to 67.8 per cent of the dentists 70 and older. It varied somewhat by region of the country, from 9.5 per cent in the Southwest to 19.8 per cent in the Central region (Table 42).

Nearly half (46.0 per cent) of the dentists reported handpiece speeds of not less than 100,000 rpm, and 61.0 per cent reported speeds of not less than 30,000. The percentage of dentists in the "super speed" category was 52.9 per cent among dentists under 30, increased to 59.0 per cent for dentists in their 30's and declined to 19.4 per cent among dentists 70 and older. The percentage of dentists report-

Table 41 • Percentage distribution of nonsalaried dentists according to speed normally used in operating handpiece, by age of dentist

Speed	–29	30–39	40–49	50–59	60–69	70–	All ages
Low	3.9	8.8	15.8	28.9	41.4	67.8	17.2
Intermediate	9.6	9.6	10.5	13.2	14.0	3.2	10.8
High	11.5	12.8	13.0	13.4	9.1	3.2	12.6
Super	52.9	59.0	46.5	27.1	16.7	19.4	46.0
Low and intermediate	1.9	.7	2.6	2.1	5.4	.0	1.8
Low and high	.6	.0	.6	.9	1.6	.0	.7
Low and super	7.7	3.5	4.2	7.5	7.5	3.2	4.9
Intermediate and high	1.9	1.1	1.3	.9	1.6	3.2	1.2
Intermediate and super	5.8	2.0	2.3	3.2	1.6	.0	2.4
High and super	4.8	1.9	3.2	2.8	1.1	.0	2.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Definitions: Low speed—under 10,000 rpm. Intermediate speed—10,000 rpm to 29,999 rpm. High speed—30,000 rpm to 99,999 rpm. Super speed—100,000 rpm and over

Table 42 • Percentage distribution of nonsalaried dentists according to speed normally used in operating handpiece, by region

Speed	New England	Middle East	South-East	South-west	Central	North-west	Far West	United States
Low	18.3	18.4	13.7	9.5	19.8	16.7	15.4	17.2
Intermediate	7.3	12.6	10.4	15.1	11.2	6.1	8.1	10.8
High	11.6	16.6	8.8	11.1	10.4	8.4	14.1	12.6
Super	47.6	39.0	52.2	48.4	48.0	49.9	47.9	46.0
Low and intermediate	1.2	3.5	1.2	1.6	.4	3.0	1.6	1.8
Low and high	1.2	.9	.6	.0	.0	.0	.0	.7
Low and super	5.5	3.1	7.3	7.1	4.4	8.3	7.1	4.9
Intermediate and high	.0	1.5	1.5	.8	1.5	.8	1.0	1.2
Intermediate and super	5.5	2.5	.9	4.8	2.0	3.8	1.3	2.4
High and super	1.8	1.9	3.4	1.6	2.3	3.0	3.5	2.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

ing only super speed ranged regionally from 39.0 per cent in the Middle East to 52.2 per cent in the Southeast.

The percentage of dentists reporting the use of super speed handpieces, either exclusively or in combination with another category, was 55.7 per cent. Among the combinations, "low and super" was most common, being reported by 4.9 per cent of all respondents. This combination was particularly prevalent in the southern and western states.

The question "If you use high speed equipment, what has been the major effect of high speed equipment on your practice?" was followed on the questionnaire by the following choices: "It has increased the number of patients treated by you," "It has reduced your time in the office," and "Other (specify)." As shown in Table 43, many dentists wrote in effects of high speed equipment not listed on the questionnaire. Had these alternatives appeared on the printed questionnaire, un-

Table 43 • Percentage of dentists who use high-speed drilling equipment reporting specified effects of high-speed equipment on their practice, by age of dentist

Effect	–29	30–39	40–49	50–59	60–69	70–	All ages
It has increased the number of patients treated by you	48.4	56.2	52.7	47.8	39.6	58.3	52.7
It has reduced your time in the office	36.9	32.2	39.8	42.8	49.1	58.3	37.2
It has made dentists' work easier—it has reduced dentists' fatigue	17.9	28.2	24.7	28.3	22.6	.0	26.3
It has reduced patients' tensions and fatigue—it has increased patients' acceptance	10.5	15.8	14.0	12.7	17.0	25.0	14.6
It has reduced chair time—it has increased work output per unit of time	8.4	8.4	6.3	5.6	8.5	.0	7.3
It has increased amount of treatment per patient per visit	13.7	7.7	7.5	3.8	5.7	.0	7.1
No effect	1.1	1.8	1.5	1.8	1.9	.0	1.7
It has increased income	4.2	1.8	1.5	.0	.0	.0	1.4
It has increased time for other dental treatments such as surgery, prosthetics, etc.	3.2	.8	.9	.0	.9	.0	.8
Other	5.3	2.9	2.0	2.1	3.8	16.7	2.7

Table 44 • Percentage of nonsalaried dentists writing one or more prescriptions for drugs during six-month period, and mean number of prescriptions written, by age of dentist

Age	Per cent writing prescriptions	Mean number of prescriptions written	
		By all nonsalaried dentists	By dentists writing prescriptions
–29	95.7	54.3	58.9
30–39	94.8	81.3	91.6
40–49	89.1	81.5	97.1
50–59	80.4	45.1	63.1
60–69	68.8	33.6	56.1
70–	42.6	8.1	32.2
All ages	89.0	67.0	83.8

doubtedly more dentists would have chosen them.

More than half (52.7 per cent) of the dentists using high speed handpieces indicated that use of such equipment had increased the number of patients treated, and 37.2 per cent indicated it had reduced their time in the office. A sizable number of dentists checked both replies. Reduction of time in the office was reported by more of the older than of the younger dentists.

It seems reasonable that the immediate effect of the installation of high speed equipment would be reduction of the dentist's working hours, whereas the ultimate effect would likely be an increase in the number of patients. The mean number of patients reported by dentists using only low speed handpieces was 1,032 compared to 1,261 for dentists using only super speed. Comparable figures for mean number of patient visits were 2,535 and 3,407. Statistics to be presented in later chapters indicate that for all nonsalaried dentists the average number of hours in the office was about the same in 1958 as in 1955, but the average number of patients treated had increased considerably.

Of the write-in responses, the most common was that high speed equipment had made the dentist's work easier or reduced his fatigue (26.3 per cent). Reduction of the patient's tension or increase of patient's acceptance of dental treatment was mentioned by 14.6 per cent.

Mean net income in 1958 varied as follows for dentists in a single category of handpiece speed: low speed, $11,965; intermediate speed, $12,718; high speed, $14,135, and super speed, $15,025.

In this survey, 89.0 per cent of the nonsalaried dentists reported writing one or more prescriptions for drugs during the preceding six months. In the 1956 survey, the figure was 85.4 per cent.

The percentage of dentists writing prescriptions was highest for dentists under 30 (95.7 per cent), almost as high for dentists in their 30's (94.8 per cent), then declined significantly with each higher age group to a low of 42.6 per cent for dentists 70 and older (Table 44). Variation by region in the practice of writing prescriptions, much less pronounced than variation by age, was from 82.4 per cent in the Far West to 95.7 per cent in the Southwest (Table 45). By city size, the writing of prescriptions was least common in places of less than 1,000 population (60.4 per cent) and most common in cities of 5,000 to 25,000 population (about 93 per cent). The figure for cities of over 1,000,000 was 84.7 per cent.

Among dentists writing prescriptions, the mean number written during the half-year period was 83.8. By age, the highest

Table 45 • Percentage of nonsalaried dentists writing one or more prescriptions for drugs during six-month period, and mean number of prescriptions written, by region

Region	Per cent writing prescriptions	Mean number of prescriptions written	
		By all nonsalaried dentists	By dentists writing prescriptions
New England	90.2	50.4	56.2
Middle East	91.1	76.0	84.1
Southeast	90.0	101.0	126.8
Southwest	95.7	122.1	127.9
Central	87.7	55.1	63.4
Northwest	89.7	73.8	82.8
Far West	82.4	64.5	79.9
United States	89.0	67.0	83.8

average was for dentists in their 40's (97.1) and the lowest for dentists 70 and older (32.2). There were large regional differences in the average number of prescriptions written by dentists writing prescriptions. The average was about twice as high in the Southwest (127.9) and the Southeast (126.8) as in New England (56.2) or the Central region (63.4).

It is estimated that nonsalaried dentists in the United States wrote 11 million prescriptions for drugs during 1958.

The next article will discuss the dentist's work week and work year.

Additions to the Library

BUREAU OF LIBRARY AND INDEXING SERVICE

The books listed here have been added recently to the Library collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing books, but there is a minimal charge of one dollar for each package library. Practically all the dental journals published in the world at present are available also to members on loan. Lists of books and package libraries are also available on request.

BOOKS

American Association of Dental Editors & American Dental Association. Ninth conference on dental journalism, March 14, 15, 1960. Chicago, 1960. 57 p. Mimeo.

Bisset, K. A. & Davis, G. H. G. The microbial flora of the mouth. London, Heywood, 1960. 100 p.

Bristol, L. B. A study of the present day silicates as to physical properties and manipulation. (Thesis—University of Michigan, School of Dentistry.) Ann Arbor, 1959. 94 p. On microfilm only.

CONGRÈS FRANÇAIS DE STOMATOLOGIE. XVI^e, Paris, 5-10 Octobre 1959. Paris, Masson, 1959. 292 p. $7.50.

DAWKINS, JOHN. An investigation into bone healing following apicectomy. (Thesis—University of Melbourne.) Melbourne, 1958. 182 p. On microfilm only.

DENTAL CLINICS OF NORTH AMERICA, July 1960. Symposia on I. Minimizing prosthodontic failures, II. Dentistry for the handicapped. Philadelphia, Saunders, 1960. 206 p.

ETTER, L. E. Glossary of words and phrases used in radiology and nuclear medicine. Springfield, Ill., Thomas, 1960. 203 p. $8.50.

FISCHER, GUIDO. Normale und pathologische Biologie des Zahnsystems; ein Versuch zur Darstellung der Lebenserscheinungen im Zahn des Menschen. Munich, Schmidt, 1953. 442 p.

FREDERICK, P. M. & TOWNER, CAROL. The office assistant in medical practice. 2d ed. Philadelphia, Saunders, 1960. 407 p. $5.25.

GOULDING, ROY. Handbook of dental pharmacology and therapeutics. London, Heinemann, 1960. 199 p. $2.40.

HARKINS, C. S. Principles of cleft palate prosthesis. New York, Columbia University Press, 1960. 219 p. $12.

HIRSCHFELD, LEONARD. Minor tooth movement in general practice. St. Louis, Mosby, 1960. 332 p. $12.

IRELAND (EIRE). FLUORINE CONSULTATIVE COUNCIL. Report. Dublin, Stationery Office, 1958. 18 p.

KERR, D. A. & ASH, M. M. Oral pathology; an introduction to general and oral pathology for hygienists. Philadelphia, Lea & Febiger, 1960. 205 p. $6.

KNISCHEWSKI, FRANZ. Materialienkunde der Zahntechnik. Teil I: Nichtmetallische Werkstoffe. 4th ed. Munich, Pflaum, 1951. 155 p.

MICHELSON, A. J. & MUSTON, J. C. The history of the army dental service. London, War Office, 1959. 24 p. Mimeo.

NOYES, F. B. Oral histology and embryology. 8th ed., edited and rev. by Isaac Schour. Philadelphia, Lea & Febiger, 1960. 440 p. $11.50.

PEYTON, F. A. Restorative dental materials. St. Louis, Mosby, 1960. 542 p. $10.50.

SOGNNAES, R. F., ed. Calcification in biological systems; a symposium presented at the Washington meeting of the American Association for the Advancement of Science, December 29, 1958. Washington, American Association for the Advancement of Science, 1960. 511 p.

TARROW, A. B. Basic sciences in anesthesiology; (a guide for study). San Antonio, Texas, Lydette, 1959. 409 p. $10.

THOMA, K. H. & GOLDMAN, H. M. Oral pathology. 5th ed. St. Louis, Mosby, 1960. 1523 p. $27.50.

THOMA, K. H. & ROBINSON, H. B. G. Oral and dental diagnosis; with suggestions for treatment. 5th ed. Philadelphia, Saunders, 1960. 549 p. $11.

U. S. NAVAL DENTAL SCHOOL. OFFICER EXTENSION COURSE. Endodontics; assignment booklet. Prepared under the supervision of the Bureau of Medicine and Surgery. (NAVPERS 10407.) Washington, Bureau of Naval Personnel, 1959. 17 p.

U. S. NAVAL DENTAL SCHOOL. OFFICER EXTENSION COURSE. Oral diagnosis; assignment booklet. (NAVPERS 10739.) Washington, Bureau of Naval Personnel, 1959. 75 p.

U. S. NAVAL DENTAL SCHOOL. OFFICER EXTENSION COURSE. Oral surgery; assignment booklet. Prepared under the supervision of the Bureau of Medicine and Surgery. (NAVPERS 10729.) Washington, Bureau of Naval Personnel, 1960. 120 p.

WALSH, R. S. General anaesthesia for dental surgery. London, Longmans, 1960. 94 p. $4.25.

WALTHER, D. P. Orthodontic notes. Bristol, Wright, 1960. 198 p. $2.80.

WILSON, W. K. & FORSHEE, B. W. Preservation of documents by lamination. Washington, Govt. Print. Off., 1959. 20 p. $0.20.

book reviews

75 YEARS OF DENTISTRY: DIAMOND JUBILEE VOLUME OF THE FLORIDA STATE DENTAL SOCIETY

By Helen S. Haines and Robert Thoburn. 418 pages, illustrated. Index. $10. Gainesville, University of Florida Press, 1960.

The student of dental history will be both delighted and disappointed in this book. His delight will arise from the evident devotion to the subject of the co-authors, Helen S. Haines and Robert Thoburn. Over more than a decade, Dr. Thoburn tirelessly and ingeniously pursued and assembled the data from which Helen S. Haines compiled this volume. The reader will be stimulated by the handsome printing given the book by the publisher. He will be diverted by the nearly endless variety of early dental anecdotes and the fascinating biographical sketches that make up the first quarter of the book.

The reader will be disappointed to find that the result is not a history. It is rather a gathering of much of the data pertinent to a history of Florida dentistry. It is a valuable repository of biographical information on leading Florida dentists. It is a useful collection of archival materials of the Florida State Dental Society. But it is not a history, either of the Society or of dentistry in Florida.

After the usual introductory matter, the book is divided into nine chapters with two appendixes, and a list of the dates, places, and presidents of the seventy-five annual meetings of the Society. The chapters are a miscellany of reminiscences, biographies, annals, topical histories, and even a roster of members. One of the appendixes lists the members who have received special honors from the Society, the other contains further brief topical histories and the constitution and articles of incorporation of the Society. The book is well illustrated with portraits of leading Florida dentists and reproductions of significant documents.

The University of Florida Press has produced an unusually attractive book. Considerable money and an imposing amount of personal dedication have been lavished on this project. It is sad that the result should be a mere commemorative volume instead of a contribution to the history of the dental profession. The American Dental Association and the American Academy of the History of Dentistry should offer guidance to the state and local societies so that the widespread historical interest and concern in the profession will not be misdirected. *Robert W. McCluggage*

REPORT WRITING IN DENTISTRY

Edited by James J. Avery and staff. Ninth edition. 70 pages. $2.25. Ann Arbor, Mich., The Overbeck Co., 1959.

This excellent manual guides even the most inexperienced author into the technics of scientific writing on dental subjects. It is compiled and edited by an obviously expert staff of dental writers and library consultants, and although the manual was prepared originally as a teaching outline for dental students, it should be considered an excellent source of material for any dentist faced with the task of technical writing for publication.

Every phase of report writing is included in the scope of the manual, from the mechanics of assembling data to the elements of style and construction in scientific writing. Also included are sections on library classification of technical books and journals, correct terminology and abbreviations, and the proper use of references. The section on scientific reporting is a concisely prepared outline for use in preparing a thesis, a review of the literature or an abstract of published material. Of great value is the "language" of the manual itself; it is objective, uncomplicated and understandable to the reader. For this reason alone the

book can be termed an excellent handbook for the technical writer and one which presents the important guide elements in practical form and logical sequence.

Added to the current edition is a detailed listing of dental periodicals throughout the world and an enlarged section on the use of the library. The book provides a wealth of excellent material of vital interest to the writer of dental reports, durably bound and easy to read. *Ernest A. Hurley*

A MANUAL OF ORAL EMBRYOLOGY AND MICROSCOPIC ANATOMY

By Dorothy Permar. Second edition. 121 pages with 59 illustrations. Index. $5.50. Philadelphia, Lea & Febiger, 1959.

This book, consisting of 12 chapters organized in a logical fashion, and well-illustrated, is designed primarily as a textbook for students of dental hygiene. It is an excellent reference book for the graduate.

The subject material is written in a style which is easily read and yet not oversimplified. The first two chapters deal with the embryonic development of the face and oral cavity and facts basic to the study of general histology. The remaining ten chapters are devoted to the histology of the tooth, supporting structures, oral mucous membrane and salivary glands and finally tooth development and eruption.

The illustrations consist of both photomicrographs and drawings that are adequately labeled so as to facilitate study in conjunction with the text material. The paper used is of good quality. The binding is sturdy and the type size and style make for ease in readability. *George W. Burke, Jr.*

DENTAL CLINICS OF NORTH AMERICA—NOVEMBER 1959 ISSUE OFFICE ORAL SURGERY

By Edward C. Hinds, D.D.S., M.D. Consulting Editor in collaboration with 20 co-authors. 266 pages with illustrations. Index. $14.00 yearly subscription, 3 issues. Philadelphia, W. B. Saunders Co., 1959.

Aside from the foreword by the consulting editor there are 16 practical chapters by 20 contributors on various aspects of oral surgery which can and should be handled in the office: in many instances by the general practitioner. Expanding knowledge and changing ideas of basic principles are apparent from the material presented. Many outmoded concepts have been omitted.

The book is well written, and the information presented in a clear manner. The divisions of subject matter are easy to follow, and the text is supported ably by excellent diagrams and illustrations. The book scarcely provides material for adverse criticism. There is a place in the literature pertaining to oral surgery for a small volume of this type. In a field where all kinds of operations are as numerous as surgeons performing them, a dogmatic approach based on years of experience and careful observation is welcome. Books of this sort are not common.

This small volume is intended primarily for the general practitioner and intern as a supplement to, rather than a substitute for standard textbooks. It permits an orderly review of subjects already studied, and should clarify many points in question by providing concise and general coverage in a few pages of material where standard textbooks may devote chapters. It may also be an excellent point of departure for the preparation of standard lectures, or considerable help in the organization of spot lectures which all teachers are called upon to give from time to time.

The book should be a welcome addition to the libraries of all general practitioners as well as to the libraries of all institutions engaged in the training of oral surgeons. This volume contains an author index for 1959, and a cumulative index from 1957-59. The binding, format, paper and type are the same high quality as previous issues of *Dental Clinics of North America.* *E. Alan Lieban*

DENTAL ROENTGENOLOGY

By LeRoy M. Ennis, and Harrison M. Berry, Jr. Fifth edition. 607 pages. Index. $15. Philadelphia, Lea & Febiger, 1959.

The book has been considerably enlarged from previous editions by the inclusion of a chapter on radiation and the paralleling technic, and by the addition of many illustrations. To a degree, the scope of the book exceeds its title in some areas, such as the chapter on the chemistry of calcification and in the discussion of case histories and treatment of occlusal disharmonies.

The book contains a wealth of well-illustrated material, but lacks a well-developed index. There is much more information in the book than is listed in the index. The illustrations, paper, and type are the finest. The book can serve as a valuable reference if concessions are made to the lack of an adequate index. *Robert J. Nelsen*

THE PREPARATION OF MEDICAL LITERATURE

By Louise Montgomery Cross. 451 pages. Index and 2 appendixes. $10. Philadelphia, J. B. Lippincott Co., 1959.

The purpose of this book, as stated in the preface, is "to present in convenient form the practical techniques of preparing medical literature for publication in journal or book form." The author has succeeded admirably. She has drawn on her 25 years of experience as a professional medical writer to produce a handbook that will be equally useful to the experienced and the beginning writer.

The scope of the book can be judged by the titles of the seven major sections: "Planning the Journal Paper or Book"; "Gathering Material for a Paper or Book"; "Writing the Journal Paper or Book"; "Style"; "Styling"; "Illustration"; and "Editing." Appendix 1 includes a list of annuals, yearbooks and reviews and Appendix 2 a list of abbreviations used in *Quarterly Cumulative Index Medicus* and *Current List of Medical Literature*.

The book is organized so that it is convenient for reference purposes; the headings are numerous and the text is written clearly and concisely. Illustrations are used where they will be helpful.

The Preparation of Medical Literature certainly should be on the shelf of every dentist who is planning to do much writing; in addition it should be in all dental school libraries. Those who are teaching writing courses in dental schools will find it invaluable since it brings together so much information and presents it in convenient form. Chapter 12, which discusses "the final typewritten manuscript," has many suggestions that would be helpful to a secretary who is typing a manuscript for her employer.

By and large, Miss Cross confines herself to generally accepted procedures; she knows that writers must work out methods which suit themselves. However, the procedures she outlines are sufficiently detailed so that relatively inexperienced writers can follow them step by step. I am sure editors will find themselves using this book extensively if it is available. Constituent and component dental societies would do well to have a copy on their bookshelves.

It is a pleasure to find a book so competently written and so well printed and bound. It certainly should enjoy wide circulation among all those concerned with scientific communication. *Geraldine Udell*

VIERZIG FRAGEN UND ANTWORTEN ZUR EINFÜHRUNG DER KOLLEKTIVEN FLUORPROPHYLAXE DER ZAHNKARIES: EIN FÜHRER FÜR GEMEINDE-, SANITÄTS- UND SCHULBEHÖRDEN (FORTY QUESTIONS AND ANSWERS CONCERNING FLUORIDATION AS A PREVENTIVE PROCEDURE TO DECREASE THE INCIDENCE OF DENTAL CARIES: A GUIDE FOR MUNICIPAL, HEALTH AND SCHOOL AUTHORITIES)

By Rudolf Jeanneret. 60 pages. Bibliography. Swiss francs 6.50. Bern, Paul Haupt, 1958.

From the mass of literature on fluoridation as a caries-preventive measure, the author, a professor of the Dental Institute of the University of Bern, Switzerland, has presented the salient facts as a guidebook for municipal, health and school authorities, engineers of water works, parents and dentists who are interested in learning about the mechanism, effects and principles of the fluoridation of drinking water.

In the first part questions asked obviously by parents, children, teachers and municipal authorities are answered in an ample, distinct and impartial manner. In the second part, the answers are directed mainly to dentists, physicians and other scientists. The problem of fluoridation is dealt with in a scientific manner. The ethical principles involved are emphasized, although too briefly.

For members of the dental profession in the United States this book apparently has little value because here more complete and detailed books have been published based on experimental projects and dental research. The book, however, contains a revealing collection of miscellaneous data on the caries incidence in the various European countries, the natural fluoride content of drinking water in specific districts, and may serve as evidence that the governments and the people of many European countries desire a definite step toward prevention of caries.

The author has succeeded in his purpose to give information on the effect of fluoridated water supplies on the prevalence of dental caries by referring to the important experimental work performed in the United States. This information has been carefully collected and correlated from the mountainous mass of published data. *Paul H. Glucksman*

deaths

BUREAU OF MEMBERSHIP RECORDS

Adams, Herbert W., Dorchester, Mass.; Boston Dental College, 1890; died May 7; age 102.

Arnold, Paul, Mahaska, Kan.; University of Nebraska College of Dentistry, 1926; died March 20; age 58.

Bailey, Wilber E., East Lansing, Mich.; University of Michigan School of Dentistry, 1915; died April 16; age 68.

Batzle, Fred A., Jersey City, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1919; died April 10; age 63.

Bell, Raymond F., Long Beach, Calif.; University of Southern California School of Dentistry, 1915; died April 14; age 70.

Biddle, Samuel C., Williamsport, Pa.; Pennsylvania College of Dental Surgery, 1902; died May 9; age 92.

Black, Marcus D., Fort Smith, Ark.; University of Tennessee College of Dentistry, 1900; died April 27; age 86.

Bozworth, Ralph W., Kansas City, Mo.; St. Louis University School of Dentistry, 1913; died March 4; age 70.

Brewer, Edson R., Peekskill, N. Y.; University of Buffalo School of Dentistry, 1918; died April 9; age 66.

Bruening, Edward H., Tucson, Ariz.; Omaha Dental College, 1903; died April 21; age 78.

Bruick, Paul E., Arlington, Va.; Indiana Dental College, 1911; died February 5; age 73.

Byrne, Lawrence H., Deming, N. M.; University of Tennessee College of Dentistry, 1910; died April 23; age 72.

Carr, Guthrie P., Lafayette, Ind.; Indiana Dental College, 1915; died February 4; age 66.

Chodosh, Jacob, Flushing, N. Y.; University of Pennsylvania School of Dentistry, 1936; died January 6; age 47.

Churchill, Herman R., Lake Wales, Fla.; Georgetown University School of Dentistry, 1922; died February 4; age 73.

Cooper, Herbert C., Parkrose, Ore.; University of Minnesota School of Dentistry, 1900; died April 6; age 84.

Cosgrove, Michael E., Worcester, Mass.; Tufts College Dental School, 1912; died April 24; age 76.

Cremin, Douglas E., St. Louis; St. Louis University School of Dentistry, 1925; died April 1; age 58.

Cundall, Clayton C., Gothenburg, Neb.; University of Nebraska College of Dentistry, 1917; died April; age 70.

DeConti, Angelo, Providence, R. I.; University of Maryland, Dental Department, 1910; died April 30; age 81.

Dooley, John H., Garberville, Calif.; Tufts College Dental School, 1903; died May 2; age 77.

Dunn, Morris S., New Britain, Conn.; University of Maryland, Dental Department, 1914; died April 6; age 74.

Durrett, Joseph R., Staunton, Va.; Medical College of Virginia School of Dentistry, 1930; died February 14; age 58.

Edwards, Ellis L., Morganton, N. C.; Atlanta Dental College, 1915; died April 24; age 70.

Exl, Henry H., Chicago; Chicago College of Dental Surgery, 1911; died January 16; age 74.

Floyd, Cecil, Columbus, Ga.; Tulane University School of Dentistry, 1926; died April 19; age 59.

Gauerke, Gilbert H., Danville, Ill.; Marquette University School of Dentistry, 1916; died April 9; age 69.

Gilruth, William A., LaGrange, Ill.; Northwestern University Dental School, 1919; died January 7; age 64.

Greenberg, Bernard W., Hackensack, N. J.; Temple University School of Dentistry, 1944; died April 8; age 38.

Grinnage, Willard T., Philadelphia; Howard University College of Dentistry, 1918; died May 2; age 69.

Grove, Cecil S., Strasburg, Va.; Medical College of Virginia School of Dentistry, 1921; died February 12; age 63.

Grove, Frank W., Eugene, Ore.; Northwestern University Dental School, 1908; died April 20; age 82.

Halle, Carl A., Winthrop Harbor, Ill.; Chicago College of Dental Surgery, 1912; died May 13; age 80.

Hamilton, Thomas W., Marion, S. C.; University of Maryland, Dental Department, 1901; died April 12; age 79.

Hedrick, Glenn A., Seattle; Western Dental College, 1903; died March 21; age 85.

Helfand, George, Freeport, N. Y.; Columbia University School of Dental and Oral Surgery, 1942; died April 15; age 43.

Herr, John M., Charlottesville, Va.; University of Maryland, Dental Department, 1909; died April 6; age 77.

Hicks, Charles J., McKinney, Texas; Atlanta Dental College, 1905; died April 19; age 75.

Hill, Boyd P., Basin, Wyo.; Kansas City-Western Dental College, 1925; died April 25; age 62.

Hill, Worl V., Chicago; University of Illinois College of Dentistry, 1951; died April 22; age 42.

Holtz, Frommhold A., Milwaukee; Milwaukee Medical College Dental Department, 1904; died December 4; age 79.

Houston, Robert F. L., South Pasadena, Calif.; University of Southern California School of Dentistry, 1930; died April 15; age 51.

Ireland, Elizabeth L., Joliet, Ill.; University of Illinois College of Dentistry, 1904; died January 13; age 84.

Jarvis, Edward W., Hartford, Conn.; Pennsylvania College of Dental Surgery, 1900; died February 1; age 82.

Jasper, Lester H., St. Louis; Washington University School of Dentistry, 1934; died May 3; age 48.

Johnson, M. L., Lead, S. D.; Chicago College of Dental Surgery, 1901; died April 12; age 82.

Johnson, Rufus G., Stevens Point, Wis.; Marquette University School of Dentistry, 1916; died April 15; age 68.

Joyce, Charles M., Fort Myers, Fla.; Royal College of Dental Surgeons School of Dentistry, Toronto, Canada, 1913; died February 19; age 68.

King, John M., Sr., Birmingham, Ala.; Vanderbilt University School of Dentistry, 1901; died February 14; age 84.

Kopf, George F., Lakeville, Conn.; Georgetown University School of Dentistry, 1934; died March 24; age 48.

Kubat, William, Orlando, Fla.; University of Minnesota School of Dentistry, 1905; died February 4; age 79.

Kunkle, Arthur A., Monessen, Pa.; University of Pittsburgh School of Dentistry, 1913; died April 24; age 79.

Landsman, Ned, New York; College of Dental and Oral Surgery, 1919; died May 3; age 63.

Lane, I. Edward, Miami Beach, Fla.; Chicago College of Dental Surgery, 1919; died April 10; age 69.

Lanigan, James E., Rockland, Mass.; died November 21; age 71.

Lemis, George T., Springfield, Mass.; University of Pennsylvania School of Dentistry, 1905; died April 22; age 77.

Lyon, Harry G., Grosse Pointe, Mich.; University of Michigan School of Dentistry, 1911; died April 7; age 72.

MacVicar, Arthur D., Port Huron, Mich.; Detroit College of Medicine, Department of Dental Surgery, 1902; died April 2; age 84.

Martin, Aubrey L., Seattle; North Pacific College of Oregon School of Dentistry, 1914; died April 14; age 68.

Mayer, Ruth W., Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1917; died February 13; age 64.

McAlpin, Victor H., Warren, Pa.; Pittsburgh Dental College Western University of Pennsylvania, 1902; died May; age 82.

McAteer, John L., Brooklyn; University of Pennsylvania School of Dentistry, 1907; died May 5; age 75.

McCloskey, Donald F., Salem, Mass.; Harvard Dental School, 1927; died April 12; age 60.

McDonald, John F., Miami, Fla.; Atlanta Dental College, 1914; died March 31; age 67.

McGrath, Leonard F., Kansas City, Mo.; Kansas City Dental College, 1913; died February 12; age 77.

McMath, John F., Jr., Oakland, Calif.; University of California College of Dentistry, 1928; died April; age 53.

McNally, Richard J., Onalaska, Wis.; University of Minnesota School of Dentistry, 1933; died December 24; age 52.

Mieras, John W., Grand Haven, Mich.; died April 16; age 81.

Moore, Robert J., Seattle; North Pacific College of Oregon School of Dentistry, 1922; died April 29; age 60.

Moran, Hugh G., Maplewood, Mo.; St. Louis University School of Dentistry, 1915; died January 24; age 78.

Morrow, Herbert J., Gloucester, Mass.; died November 11; age 91.

Murata, Seizo, San Francisco; University of California College of Dentistry, 1932; died April 24; age 55.

Needelman, Sam, Chicago; Chicago College of Dental Surgery, 1923; died April 27; age 63.

Nesbett, Norman B., Belmont, Mass.; Harvard Dental School, 1899; died April 27; age 83.

Northrup, Robert E. L., Franklinville, N. Y.; University of Buffalo School of Dentistry, 1904; died April 8; age 86.

Oelschlager, John M., Cleveland; University of Illinois College of Dentistry, 1917; died February 6; age 67.

Ogden, William A., Binghamton, N. Y.; Philadelphia Dental College, 1900; died April 15; age 83.

Peabody, Jess M., Denver; University of Denver School of Dentistry, 1925; died April 6; age 59.

Perkins, George T., San Antonio, Texas; Washington University School of Dentistry, 1929; died April 22; age 53.

Phillips, Pliny H., Reno, Nev.; Western Dental College, 1911; died April 20; age 75.

Plumpe, William H., St. Louis; Marion-Sims Dental College, 1904; died January 30; age 84.

Polk, Avron M., New York; New York College of Dentistry, 1917; died April 12; age 64.

Prange, Charles E., Stamford, Conn.; died February 17; age 79.

Reed, Joseph H., Goodland, Kan.; University of Denver School of Dentistry, 1917; died April 19; age 69.

Reichert, Jerome A., Milwaukee; Marquette University School of Dentistry, 1922; died December 27; age 62.

Rice, George W., Milton, Mass.; Tufts College Dental School, 1923; died April 22; age 60.

Richards, Phillip, Spokane, Wash.; North Pacific College of Oregon School of Dentistry, 1931; died April 12; age 53.

Ritter, Edmund J., Louisville, Ky.; Louisville College of Dentistry, 1912; died April 23; age 70.

Robinson, Rufus L., Rye, N. Y.; died April 28; age 92.

Rogers, Cyril W., Ridgewood, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1922; died May 3; age 62.

Romaine, Jean H., Hillsboro, Ore.; North Pacific College of Oregon School of Dentistry, 1932; died May 2; age 57.

Saskor, Ludwig A., Hermosa Beach, Calif.; Chicago College of Dental Surgery, 1917; died April 17; age 63.

Schneider, John, Chicago; Chicago College of Dental Surgery, 1926; died May 12; age 70.

Scott, Hiram L., Hamilton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1904; died April 21; age 80.

Selberg, Alver, San Francisco; University of Minnesota School of Dentistry, 1922; died April 25; age 59.

Sharp, Everett T., Victor, N. Y.; University of Pennsylvania School of Dentistry, 1901; died January 15; age 81.

Shea, Walter J., Hoosick Falls, N. Y.; University of Pennsylvania School of Dentistry, 1919; died April 20; age 62.

Shubow, Abraham S., Winthrop, Mass.; Tufts College Dental School, 1918; died March 11; age 64.

Sieck, Walter E., Trenton, N. J.; University of Pennsylvania School of Dentistry, 1935; died February 11; age 49.

Siewert, Benjamin F., Menomonee Falls, Wis.; Marquette University School of Dentistry, 1912; died November 27; age 73.

Skinner, Perry R., Amsterdam, N. Y.; Philadelphia Dental College, 1899; died January 28; age 85.

Slack, Roy B., Chicago; Northwestern University Dental School, 1914; died March 19; age 69.

Smith, Anderson C., Bluefield, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1920; died April 15.

Smith, Dowell W., Atlanta, Ga.; Atlanta-Southern Dental College, 1943; died March 31; age 41.

Smith, Robert, Chicago; University of Illinois College of Dentistry, 1924; October 16; age 64.

Smith, W. T., Dickson, Tenn.; Vanderbilt University School of Dentistry, 1908; died April 5; age 73.

Solmes, Frederick R., Detroit, Mich.; Philadelphia Dental College, 1903; died April 29; age 80.

Solomon, Morris, New York; Tufts College Dental School, 1935; died October 10; age 48.

Sommer, Anthony F., Cocoa, Fla.; University of Michigan School of Dentistry, 1916; died April 30; age 70.

Sorensen, Carl A., Omaha; Omaha Dental College, 1906; died April 17; age 76.

Souders, Harry W., Phillipsburg, N. J.; Pennsylvania College of Dental Surgery, 1897; died February 11; age 89.

Sperow, William H., Bluefield, W. Va.; University of Maryland, Dental Department, 1905; died March 8; age 77.

Stallman, Edward F., Waterloo, Ill.; St. Louis University School of Dentistry, 1918; died February 3; age 67.

Stanley, Josephus C., Chicago; Meharry Medical College School of Dentistry, 1916; died March 4; age 72.

Steinmetz, Charles, Kansas City, Kan.; Western Dental College, 1904; died April 22; age 82.

Stewart, Oliver M., Birmingham, Ala.; Vanderbilt University School of Dentistry, 1925; died January 21; age 56.

Stiff, Frank W., Tappahannock, Va.; Baltimore College of Dental Surgery, University of Maryland, 1886; died February 7; age 98.

Stirling, Peter, Fall River, Mass.; Pennsylvania College of Dental Surgery, 1904; died March 17; age 90.

Stott, Thomas A., Decatur, Ill.; University of Illinois College of Dentistry, 1944; died January 22; age 39.

Struble, William C., Castlewood, S. D.; St. Louis Dental College, 1905; died March 1; age 80.

Sturdevant, Homer C., Linesville, Pa.; Philadelphia Dental College, 1893; died April 7; age 91.

Sutherland, Byron C., Santa Cruz, Calif.; Boston Dental College, 1899; died December 21; age 84.

Swift, Earl B., Birmingham, Mich.; University of Michigan School of Dentistry, 1919; died January 23; age 68.

Sykes, Albert E., Berkeley, Calif.; College of Physicians and Surgeons, 1900; died March 24; age 86.

Taylor, James L., Parkersburg, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1926; died April 8; age 58.

Taylor, William F., Denver; University of Denver School of Dentistry, 1925; died February 28; age 64.

Teifeld, Samuel H., Millburn, N. J.; New York College of Dentistry, 1921; died April 7; age 62.

Temple, Charles P., Ventura, Calif.; University of Southern California School of Dentistry, 1926; died April 10; age 56.

Thomas, Jerome E., Clarington, Ohio; Western Reserve University School of Dentistry, 1923; died April 6.

Thompson, Clarence A., Connersville, Ind.; Indiana University School of Dentistry, 1926; died January 9; age 58.

Thorburn, Lloyd M., Marshall, Minn.; University of Minnesota School of Dentistry, 1911; died February 12; age 73.

Titus, Clinton B., Emmett, Idaho; North Pacific College of Oregon School of Dentistry, 1918; died March 25; age 64.

Todd, Samuel E., Forest Grove, Ore.; North Pacific College of Oregon School of Dentistry, 1911; died February 14; age 76.

Trotter, Powell B., Memphis, Tenn.; Louisville College of Dentistry, 1907; died January 15; age 81.

Van Osdol, Cortes D., Warsaw, Ind.; Indiana University School of Dentistry, 1934; died January 15; age 56.

Van Riper, William B., Paterson, N. J.; Philadelphia Dental College, 1906; died March 1; age 80.

Van Wijk, Albert, Pasadena, Texas; Northwestern University Dental School, 1924; died March 28; age 72.

Vaught, Gilbert R., Carbondale, Ill.; St. Louis University School of Dentistry, 1942; died January 16; age 44.

Wallace, Curtis O., Nacogdoches, Texas; Texas Dental College, 1932; died April 18; age 50.

Walsh, John A., Waterford, Conn.; Philadelphia Dental College, 1917; died April 15; age 68.

Ward, Alvin D., Garwin, Iowa; University of Iowa College of Dentistry, 1914; died March 7; age 67.

Wash, Atwood M., Richmond, Va.; Medical College of Virginia School of Dentistry, 1919; died February 27; age 69.

Watkins, Leroy, Youngstown, Ohio; Starling-Ohio Medical College Department of Dentistry, 1914; died April 11; age 75.

Watkins, Ralph D., Chester, W. Va.; Indiana Dental College, 1921; died April 23; age 59.

Watson, Henry C., Jr., West Grove, Pa.; Temple University School of Dentistry, 1934; died May 3; age 51.

Weaver, Roy A., Ellensburg, Wash.; Indiana Dental College, 1903; died February 14; age 79.

Weinberg, Charles, Philadelphia; Pennsylvania College of Dental Surgery, 1909; died March 8; age 76.

Weinberger, Bernhard W., New Orleans; University of Pennsylvania School of Dentistry, 1908; died May 8; age 74.

Weir, Robert J., Seattle; Ohio State University College of Dentistry, 1913; died May 8; age 73.

Weiss, Henry, Newark, N. J.; New York College of Dentistry, 1924; died February 3; age 57.

Welch, Will C., Terre Haute, Ind.; Northwestern University Dental School, 1916; died March 4; age 79.

Wentworth, Silas E., Hopedale, Mass.; died March 17; age 60.

Westbrook, James T., LaGrange, N. C.; died February 4; age 58.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
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All expressions of opinion and statements of supposed fact are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. Articles are accepted with the understanding that they have not been published previously and that they are submitted solely to The Journal. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Index Medicus, Biological Abstracts and Chemical Abstracts.

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One-Hundred and First Annual Session	October 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	October 16-19, 1961	Philadelphia
One-Hundred and Third Annual Session	October 29-November 1, 1962	Miami Beach, Fla.
One-Hundred and Fourth Annual Session	October 14-17, 1963	Atlantic City, N.J.
One-Hundred and Fifth Annual Session	November 9-12, 1964	San Francisco

MEETINGS OF CONSTITUENT SOCIETIES

State	*Date*	*Place*	*Secretary and Address*
Alabama	Apr. 24-26	Mobile	C. R. Crook, Professional Center, Montgomery
Alaska	July 10-12	Anchorage	W. E. Alexander, 406 G St., Anchorage
Arizona	Apr. 12-15	Phoenix	J. F. Vaughn, 2727 N. Central Ave., Phoenix
Arkansas	Apr. 9-12	Little Rock	D. M. Hamm, Box 89, Clarksville
California	Apr. 16-19	San Francisco	W. J. Healy, 518 Sutter St., San Francisco 2
S. California	Apr. 24-26	Los Angeles	J. H. Thomason, 903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 2-5	Colorado Springs	G. H. Siersma, 724 Republic Bldg., Denver 2
Connecticut	May 10, 11	Hartford	E. S. Arnold, 37 Linnard Rd., W. Hartford
Delaware	June 9, 10	Wilmington	W. W. Flanagan, Jr., 309 S. State, Dover
Dist. of Columbia	Mar. 12-15	Washington	B. D. Mattox, 1835 Eye St., N.W., Washington 6
Florida	May 21-24	Miami Beach	E. M. Farber, 518 Tampa St., Tampa
Georgia	Oct. 2-5	Savannah	F. M. Butler, Jr., 701 Southern United Bldg., Macon
Hawaii	Oct. 24-27	Honolulu	J. H. Dawe, 291 Alexander Young Bldg., Honolulu 13
Idaho			H. E. Burgess, 151 Fourth Ave., N., Twin Falls
Illinois	May 8-10	Peoria	P. W. Clopper, 632 Jefferson Bldg., Peoria
Indiana	May 14-17	Indianapolis	C. L. Howell, 1012 Hume Mansur Bldg., Indianapolis 4
Iowa	May 1-3	Des Moines	H. N. Hake, 639 Insurance Exchange Bldg., Des Moines 9
Kansas	May 7-9	Kansas City, Mo.	F. A. Richmond, Brotherhood Bldg., Kansas City 1
Kentucky	Apr. 9-12	Louisville	A. B. Coxwell, Jr., 2208 Dundee Rd., Louisville 5
Louisiana	May 5-7	Lafayette	J. S. Bernhard, 231 Atkins Ave., Shreveport 26
Maine	June 15-17	Rockland	S. M. Gower, 6 Coburn Ave., Skowhegan
Maryland	May 7-10	Baltimore	W. Schunick, 19 Medical Arts Bldg., Baltimore 1
Massachusetts	Apr. 30-May 3	Boston	H. E. Tingley, 227 Commonwealth Ave., Boston
Michigan	Apr. 10-12	Detroit	F. Wertheimer, Michigan Dept. of Health, Lansing
Minnesota	Apr. 17-19	Minneapolis	C. V. E. Cassel, 2236 Marshall Ave., St. Paul 4W
Mississippi	June 25-28	Biloxi	M. C. O'Keefe, Medical Arts Bldg., Jackson 2

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State	Date	Place	Secretary and Address
Missouri	May 7-10	Kansas City	E. D. Suggett, Merchants Bank Bldg., Jefferson City
Montana	May 4-6	Great Falls	R. C. Ritter, 1236 N. 28th St., Billings
Nebraska	Apr. 24-26	Lincoln	F. A. Pierson, Federal Securities Bldg., Lincoln
Nevada	May	Las Vegas	O. M. Seifert, 821 Ryland Ave., Reno
New Hampshire	June 18-20	Whitefield	F. E. Williams, 517 Milton St., Manchester
New Jersey	May 14-17	Atlantic City	J. G. Carr, 407 Cooper St., Camden
New Mexico	May 10-13	Albuquerque	E. P. Purtell, 2917 Santa Cruz Ave., S.E., Albuquerque
New York	May 15-17	Syracuse	C. A. Wilkie, 268 Ashland Pl., Brooklyn 17
North Carolina	May 14-17	Pinehurst	S. B. Towler, P.O. Box 11065, Raleigh
North Dakota			D. R. Perry, Box 866, Bismarck
Ohio	Nov. 13-16	Columbus	E. G. Jones, 185 E. State St., Columbus
Oklahoma	Apr. 23-26	Tulsa	W. C. Hopkins, 210 Plaza Court Bldg., Oklahoma City
Oregon	Mar. 6-8	Portland	T. D. Holder, Selling Bldg., Portland
Panama C. Z.			H. L. Mertz, Jr., P.O. Box 1417, Balboa
Pennsylvania	May 18, 19	Hershey	I. Sissman, 217 State St., Harrisburg
Puerto Rico	Jan. 22-25	San Juan	R. Gonzalez R., Box 10452, Caparra Heights
Rhode Island	Jan. 17, 18	Providence	E. M. Nelson, 901 Union Trust Bldg., Providence
South Carolina	May 7-10	Columbia	J. E. Wallace, 1506 Gregg St., Columbia
South Dakota	May 14-16	Aberdeen	R. E. Decker, 2909 Poplar Dr., Sioux Falls
Tennessee	May 14-18	Gatlinburg	K. P. Ezell, 119 Louise Ave., Nashville 5
Texas	Apr. 30-May 3	Houston	C. A. McMurray, 3707 Gaston Ave., Dallas 10
Utah	May 18-20	Salt Lake City	R. C. Dalgleish, 1554 Princeton Ave., Salt Lake City
Vermont	June 22-24	Vergennes	E. C. Woods, 128 Merchants Row, Rutland
Virginia	Apr. 30-May 3	Roanoke	M. E. Henderson, Shenandoah Bldg., Roanoke 11
Washington			D. R. Shaw, 417 Grosvenor House, 500 Wall St., Seattle 1
West Virginia	July 16-19	White Sulphur Springs	P. H. Loflin, 109 E. Main St., Beckley
Wisconsin	Apr. 24-26	Milwaukee	C. J. Baumann, Jr., 704 W. Wisconsin Ave., Milwaukee
Wyoming	June 15-17	Laramie	T. J. Drew, State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

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Alabama	June 25-30* June 26†	Birmingham	W. L. Smith, 524 Chestnut St., Gadsden
Alaska			J. E. Miller, 1000 Fireweed Lane, Anchorage
Arizona			W. G. Biddulph, 1611 N. Second Ave., Glendale
Arkansas	June 18-23*†	Little Rock	G. Cone, 113 S. Pecan St., Osceola
California			T. R. Flinn, 1021 O St., Rm. A-597, Sacramento 14
Colorado			B. DeRose Republic Bldg., Denver 2
Connecticut			M. J. Zazzaro, 99 Pratt St., Hartford 3
Delaware			J. F. Maguire, 1200 N. Van Buren St., Wilmington
Dist. of Columbia	Jan. 9-13*†	Washington	J. A. Madden, 1740 Massachusetts Ave., N.W., Washington 11
Florida	July 2-12* July 2, 3†	Jacksonville	R. P. Taylor, Jr., P.O. Box 2913, Jacksonville 3
Georgia	May 29-31	Atlanta	H. M. Robertson, 206 Donehoo St., Statesboro
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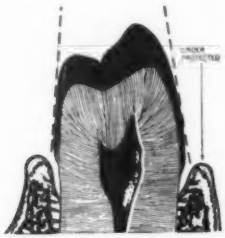
Crown Contour

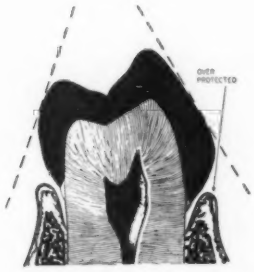
In prosthetic restorations the importance of reproducing, in their most minute detail, each of the various parts of the occlusal surface of the tooth is well recognized. With less than the regular number of teeth present to withstand the stress of mastication, the maximum efficiency of each unit restored becomes extremely important.

The importance of the axial or circumferential contour of cast gold crowns, however, is more often neglected. Its importance cannot be over-emphasized. The illustrations show three contours; the first under-contoured, the second over-contoured, and the third with the correct contour. The dotted lines show the manner in which food is deflected.



UNDER CONTOURED

Fig. 1



OVER CONTOURED

Fig. 2

NORMAL CONTOURED

Fig. 3

The under-contoured crown (Fig. 1), shown at left, probably causes the greatest amount of damage by affording no protection at all to the investing tissues. Both this and the over-contoured crown are definitely detrimental to the investing tissues since they result in an unhygienic condition and ultimate pathology.

The over-contoured crown (Fig. 2), shown at left, obviously affords too much protection to the investing tissues and the result will be stasis of these tissues.

The normal-contoured crown, on the other hand, shown above in Fig. 3, gives protection but affords proper stimulation to the investing tissues and will tend to keep them in a normal, healthy condition. *The J. M. Ney Company, Hartford 1, Connecticut.*

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North Dakota			F. A. Maides, First National Bank Bldg., Grand Forks
Ohio			D. E. Bowers, 322 E. State St., Columbus 15
Oklahoma			W. H. Stephens, Plaza Court Bldg., Oklahoma City
Oregon	Dec. 5-7	Portland	C. Wheeler, Medical Arts Bldg., Portland
Pennsylvania	Dec. 1, 2* Dec. 1†	Philadelphia	P. Swanson, 8111 Jenkins Arcade, Pittsburgh
Puerto Rico			J. Mercado C., Comercio St., #452, San Juan
Rhode Island			A. E. Turcone, 298 Broadway, Providence
South Carolina			W. J. Brockington, 1508 Washington St., Columbia 1
South Dakota			H. T. Aker, Canton
Tennessee	Dec. 14-17	Memphis	C. R. Aita, Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber, Capital National Bank Bldg., Austin 16
Utah			H. R. Nordberg, 143 S. Main St., Salt Lake City 1
Vermont			P. M. Fitch, Newport
Virginia	June 12-17* June 14, 15†	Richmond	J. M. Hughes, Medical Arts Bldg., Richmond
Washington			W. B. Lamey, Medical Dental Bldg., Everett
West Virginia	June 19-21* June 20, 21†	Morgantown	A. B. Drake, 1355 Fourth Ave., Huntington
Wisconsin	Jan. 9-11*†	Milwaukee	S. F. Donovan, Tomah
Wyoming			W. J. Ryan, Boyd Bldg., Cheyenne

**Dental examination.* †*Dental hygiene examination.* ‡*Write to secretary of dental examining board for information on locations of examinations. Most states require applications to be in 30 days prior to examination date.*

THE SUPERSPEED
miniature head FG HANDPIECE

Designed for the quick removal of bulk tooth structure for individual preparations or full mouth rehabilitation. Produces speed to 150,000 r.p.m.
Precision built to extremely close tolerances.
Comfortable to handle
Light weight
Well balanced
Convenient contra angle shape
The Miniature Head FG Superspeed uses standard FG cutting instruments. Its shorter, smaller diameter head provides greater maneuverability in the mouth, better visibility and easier access to posterior preparations.

Perfect Companion to the Fabulous Imperator

Superspeed handpiece and all Imperator handpieces are instantly interchangeable on standard Imperator Wrist Pulley.

Change from one to another as requirements indicate with complete ease.

You have the freedom to select the cutting speed most suited to your personal preference. Only the Imperator and the Kerr Superspeed miniature head FG Handpiece offer you this versatility.

KERR **THE SUPERSPEED**
miniature head FG HANDPIECE

KERR MANUFACTURING COMPANY Detroit 8, Michigan

NATIONAL EXAMINATIONS

Name	*Date*	*Place*	*Secretary and Address*
American Board of Dental Public Health	Oct. 13, 14	Los Angeles	D. J. Galagan, Divn. of Dental Public Health, PHS, Dept. of Health, Education and Welfare, Washington, D.C.
American Board of Oral Pathology	Dec. 3, 4	Baltimore	D. A. Kerr, School of Dentistry, University of Michigan, Ann Arbor, Mich.
American Board of Oral Surgery	Dec. 5 Mar. 17-21	Chicago	L. M. FitzGerald, Roshek Bldg., Dubuque, Iowa
American Board of Orthodontics	Apr. 10-15	Denver	A. W. Moore, University of Washington, School of Dentistry, Seattle 5
American Board of Pedodontics	Nov. 28-Dec. 1	New York	R. L. Ireland, College of Dentistry, University of Nebraska, Lincoln 8, Neb.
American Board of Periodontology	Apr. 10-12	Indianapolis	B. O. A. Thomas, 668 Homer Ave., Palo Alto, Calif.
American Board of Prosthodontics	Aug. 14-19	Chicago	C. H. Jamieson, David Whitney Bldg., Detroit 26
Council on Dental Education Dental Aptitude Tests	Oct. 14, 15		S. Peterson, 222 E. Superior St., Chicago 11
National Board of Dental Examiners	Dec. 5, 6		Grace Parkin, 222 East Superior St., Chicago 11

MEETINGS OF OTHER ORGANIZATIONS

Name	*Date*	*Place*	*Secretary or Chairman and Address*
Academy of General Dentistry	Oct. 17-20	Los Angeles	A. L. Knab, 8500 Stony Island Ave., Chicago
American Academy of Dental Medicine	Dec. 4	New York	G. F. Clarke, 554 Franklin St., Melrose, Mass.
American Academy of Gold Foil Operators	Oct. 14, 15	Los Angeles	C. C. Latham, P.O. Box 266, Coronado, Calif.
American Academy of the History of Dentistry	Oct. 14	Los Angeles	M. B. Asbell, 25 Haddon Ave., Camden 3, N.J.
American Academy of Implant Dentures	Oct. 14-16	Los Angeles	A. N. Cranin, 2120 Ocean Ave., Brooklyn 29
American Academy of Maxillofacial Prosthetics	Oct. 20-22	Los Angeles	M. C. Cleaver, 2330 Linwood Ave., Coytesville, N.J.
American Academy of Oral Roentgenology	Oct. 14, 15	Los Angeles	T. S. Grant, University of California Medical Center, San Francisco 22
American Academy of Periodontology	Oct. 13-15	Santa Monica, Calif.	H. A. Hartman, 4187 Pearl Rd., Cleveland 9
American Academy of Restorative Dentistry	Feb. 4, 5	Chicago	M. H. Mortonson, Jr., 735 N. Water St., Milwaukee 2
American Association of Dental Editors	Oct. 15	Los Angeles	S. Epstein, 260 Santa Clara Ave., San Francisco
American Association of Dental Examiners	Oct. 14, 15	Los Angeles	C. J. Schweikhardt, 20 Durand Rd., Maplewood, N.J.
American Association of Dental Schools	Mar. 26-29	Boston	R. Sullens, 840 N. Lake Shore Dr., Chicago 11
American Association of Orthodontists	Apr. 16-21	Denver	E. E. Shepard, 225 S. Meramec Ave., St. Louis 5
American College of Dentists	Oct. 16	Los Angeles	O. W. Brandhorst, 4236 Lindell Blvd., St. Louis 8
American Dental Assistants Association	Oct. 17-20	Los Angeles	Mrs. E. Troutman, First National Bank Bldg., La Porte, Ind.
American Dental Assistants Certification Board	Oct. 12-16		D. Thacker, 1419 "S" St., S.E., Washington 20, D.C.
American Dental Society of Anesthesiology	Oct. 15, 16	Los Angeles	H. A. Sultz, 1275 Delaware Ave., Buffalo 9
American Denture Society	Oct. 14, 15	Los Angeles	V. L. Steffel, College of Dentistry, Ohio State University, Columbus

PROTEIN

essential in time of crises

First among nutrients, protein is needed by hungry helpless children in economically less well-developed countries of the world . . . so they may live and grow . . . and may elevate the educational, health and economic status of their countries as healthy vigorous adults.

In such countries, protein malnutrition occurs when the diet is deficient in amount or quality of the protein consumed . . . with or without sufficient calories. In children this may result in retardation or cessation of growth . . . weight loss . . . edema . . . muscular wasting . . . apathy and other psychic changes . . . dermatitis . . . changes in hair . . . diarrhea . . . enlargement of liver from fatty infiltration . . . changes in protein, albumin, amino acids and certain enzymes in blood serum . . . and poor absorption of fat during acute stages.

Children 1 to 3 years old are most vulnerable . . . displaying acute deficiency after weaning on a diet devoid of milk or other forms of animal protein . . . usually precipitated by infection or other stress. In Haiti . . . 2/3rds of the children of this age are believed to suffer some degree of protein malnutrition. In the United States, protein malnutrition is rarely seen.

Oral feeding of milk is the preferred treatment for children with chronic severe protein malnutrition. Supplementation of milk with lysine does not improve its nutritive value. Where anemia is apparent, iron or folic acid supplement may be needed.

Milk is man's first dietary source of protein . . . and is the most economical and continuously available source of high quality protein of animal origin in the world today. Wherever milk is made available to hungry children, protein deficiency can be prevented or corrected.

The nutritional statements made in this advertisement have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current authoritative medical opinion.

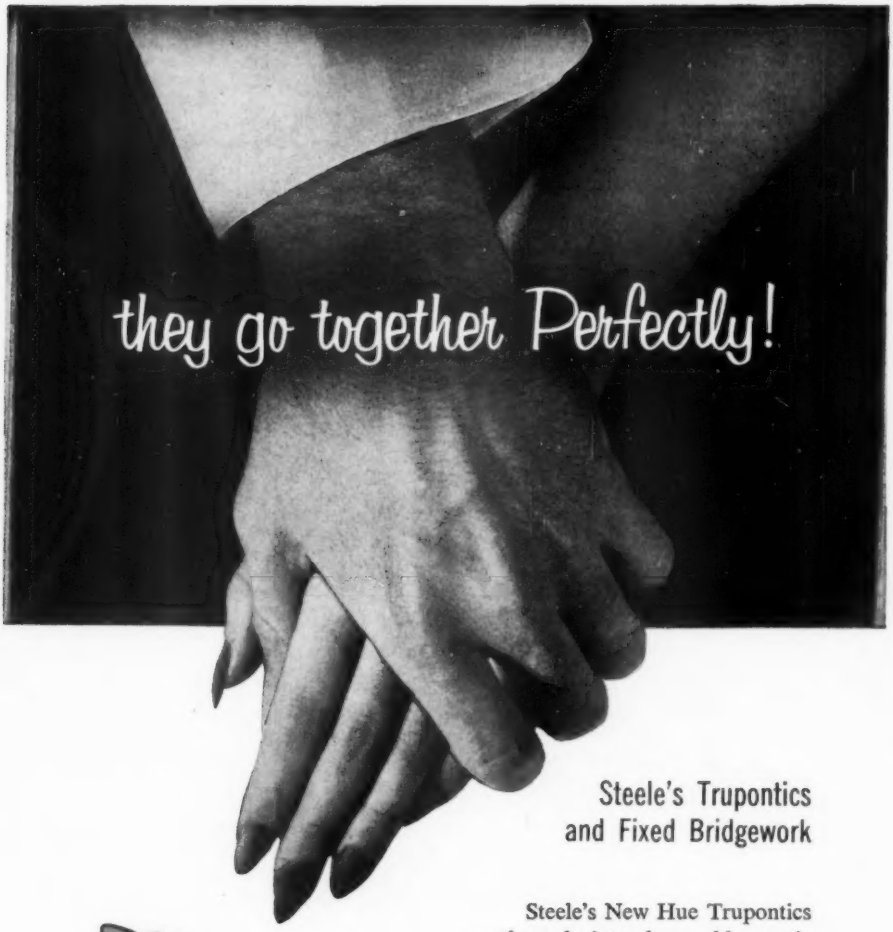
Since 1915 . . . promoting better health through nutrition research and education

NATIONAL DAIRY COUNCIL

A non-profit organization

111 North Canal Street • Chicago 6, Illinois

Name	*Date*	*Place*	*Secretary or Chairman and Address*
American Equilibration Society	Feb. 2	Chicago	R. C. Van Dam, 11431 S. Halsted St., Chicago 28
American Institute of Oral Biology	Oct. 8-12	Palm Springs, Calif.	M. Lewis, 2240 Channing Way, Berkeley 4, Calif.
American Public Health Association, Dental Health Section	Oct. 31-Nov. 4	San Francisco	D. F. Striffler, P.O. Box 711, Santa Fe, N. Mex.
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 24	New York	M. H. Feldman, 730 Fifth Ave., New York 19
American Society of Dentistry for Children	Oct. 14-16	Los Angeles	W. O. Young, 120 N. Capitol Blvd., Boise, Idaho
American Society of Oral Surgeons (Forty-second)	Oct. 12-15	Phoenix, Ariz.	D. C. Trexler, 840 N. Lake Shore Dr., Chicago 11
Association of American Women Dentists	Oct. 17	Los Angeles	G. Cramer, 95 W. Broadway, Salem, N.J.
Central Dental Association	Feb. 19-22	Aspen, Colo.	D. I. Muirhead, Hastings, Minn.
Chicago Dental Society	Feb. 5-8	Chicago	K. S. Richardson, 30 N. Michigan Ave., Chicago
Cuban Dental Congress (Fifth National and First International)	Oct. 24-27	Havana	R. Madan, Calle L., 353, Vedado, Havana, Cuba
Denver Dental Association	Jan. 8-11	Denver	G. L. Ogle, Republic Bldg., Denver 2
Great Lakes Society of Orthodontists	Nov. 27-30	Cincinnati	E. A. Cheney, 635 Applegate Lane, East Lansing, Mich.
Greater New York Dental Meeting (Thirty-sixth)	Dec. 5-9	New York	M. Purdy, 106-A Hotel Statler Hilton, New York
International College of Dentists, U.S.A. Section	Oct. 15, 16	Los Angeles	H. O. Westerdahl, 4829 Minnetonka Blvd., Minneapolis 16
International Dental Meeting of Paris (Thirty-fourth)	Nov. 21-27	Paris	M. J. Boursier 17, rue du Colisée, Paris 8e, France
Mid-Continent Dental Congress	Nov. 27-30	St. Louis	J. E. Brophy, 8013 Maryland Ave., St. Louis 5
Mid-West Society of Periodontology	Feb. 4	Chicago	L. Howlett, Jr., Medical Arts Bldg., Springfield, Mo.
New England Dental Society	Oct. 5, 6	Medford, Mass.	W. F. O'Meara, 904 Main St., Hartford 3, Conn.
New Orleans Dental Conference (Thirteenth)	Nov. 13-16	New Orleans	M. R. Matta, Maison Blanche Bldg., or J. O. Kuebel, Jr., 1636 Louisiana Ave., New Orleans
Northeastern Society of Orthodontists	Nov. 13-15	Boston	D. Mossberg, 36 Central Park S., New York 19
Northeastern Society of Periodontists	Nov. 4	New York	I. W. Scopp, V. A. Hospital, First Ave. at E. 24 St., New York 10
Odontological Society of Western Pennsylvania	Oct. 25-27	Pittsburgh	H. D. Butts, Jr., Jenkins Bldg., Pittsburgh 22
Pan Pacific Dental Conference	Oct. 23-27	Honolulu, Hawaii	F. A. Sandberg, 280 Lewers Rd., Honolulu 15, Hawaii
Paraguay National Dental Meeting (Third)	Oct. 26-29	Asuncion	H. Oxilia, Casilla de Correo 565, Asuncion
Western District Dental Group (International)	Nov.	Buenos Aires, Argentina	M. Elkin, Tucuman 1694, Buenos Aires, Argentina



Steele's Trupontics and Fixed Bridgework

Steele's New Hue Trupontics — the only interchangeable pontic with porcelain contact to tissue — assure your patients years of comfort and satisfaction.

Interchangeability, so important in fixed bridgework, is synonymous with Steele's. You can rely on this interchangeability when you use Steele's Teeth and Backings — they go together perfectly and are unsurpassed in quality.

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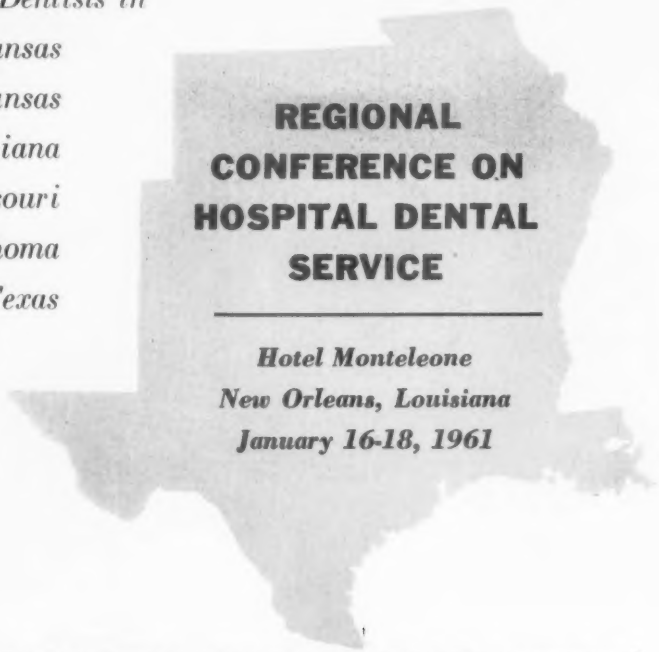


REGIONAL CONFERENCE ON HOSPITAL DENTAL SERVICE

Hotel Monteleone
New Orleans, Louisiana
January 16-18, 1961

WHY ARE HOSPITAL DENTAL SERVICE PROGRAMS SO IMPORTANT?

Today the hospital is the community center for health services. Dentistry must be represented in this community center. The dentist must take the initiative to promote and facilitate the proper development of dental services in hospitals.

This Regional Conference will bring to the constituent and component societies, the committees on hospital dental service and other interested health agencies, a program for establishing dental services in hospitals. The conference will offer a step-by-step plan for developing active dental service programs for hospitals. Plan to participate now! No registration fee is required.

conducted by
Council on Hospital Dental Service
American Dental Association

Louisiana Dental Association
host society

Council on Hospital Dental Service
American Dental Association
222 East Superior Street
Chicago 11, Illinois

Please send me the preliminary program and available information on the Regional Conference on Hospital Dental Service.

Name_____

Address_____

City_____ Zone____ State_____

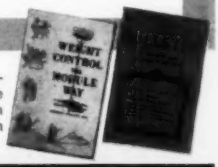
When you sit down with a person who needs help in diet planning—where do *you* begin? What is *your* approach to national overweight—said to be America's gravest health problem?

Nutritionist Herbert Pollack, M.D., who is Chairman of the Nutrition Committee, American Heart Association, bluntly begins—"An ounce prevented is better than a pound cured." He then outlines a new, medically-accepted method of combating overweight.

His pamphlet, "Weight Control The Module Way," applies basic principles in simple, easy-to-follow instructions for the layman. Calorie-rated groups of food and calorie-rated types of physical activity become "modules." Add or subtract these "food" or "activity" modules to the pattern of daily living. You gain, lose or maintain weight—by design!

Dr. Pollack's exciting and practical concept of weight control was first presented at an American Heart Association-sponsored Symposium, and the *Bulletin* of the New York Academy of Medicine has reprinted in full the papers from that meeting. Thus the *Bulletin* becomes a current text on obesity—on anthropological and genetic factors; pathology; influence on morbidity and mortality; caloric cost of living; diet planning; and prophylaxis of obesity.

The *Bulletin* reprint and "Weight Control The Module Way" are available free. Send for your review copies today.



The nutritional statements in the "Weight Control . . ." pamphlet have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current, authoritative medical opinion.

ENRICHED . . .

and whole wheat flour foods are listed among the "Essential Four" food groups set up by the U.S. Dept. of Agriculture's Institute of Home Economics. Diet selected from these foods provides ample protein, vitamins and minerals.

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working for a healthier America through nutrition

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To: Wheat Flour Institute Dept. ADLA-9
309 West Jackson Blvd., Chicago 6, Ill.

Please send me for my professional review a reprint of the Symposium on the "Prevention of Obesity," and a copy of the pamphlet, "Weight Control The Module Way." (Please Print)

NAME_____

ADDRESS_____

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(offer limited to United States and Possessions)

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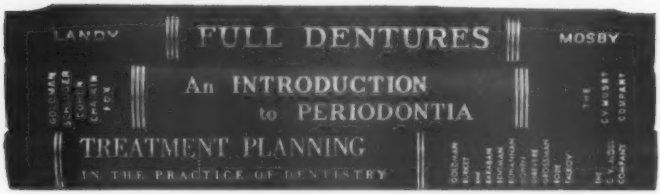
THE POSTGRADUATE DENTAL LECTURE SERIES



Just Published! **Healey ENDODONTICS**

First Book to Simplify Endodontic Procedures

In writing this concise new volume in The Postgraduate Dental Lecture Series, the author had one particular aim in view: to simplify the presentation of effective endodontic procedures and to make them more readily understood by any dentist who wishes to improve his skills and to remain abreast of all the new developments in endodontic therapy. This eminently practical book clearly explains how to perform all of these modern techniques in endodontic therapy more comprehensively than any other book:

- How to localize pain to a particular tooth.
- How to select cases for treatment.
- How to bleach discolored teeth.
- How to handle problems of restoration after treatment.
- How to construct an inexpensive and efficient incubator for processing root canal culture tests.
- How to perform apical and other surgical procedures.
- How to enlarge and fill the root canal.
- How to use and apply the rubber dam more effectively.
- How to write prescriptions for systemic medications used in association with endodontic treatments.
- How to manage fractured anterior teeth in children.
- How to replant dislodged teeth.

By HARRY J. HEALEY, A.B., D.D.S., M.S.D., F.A.C.D., Chairman, Division of Endodontics, Indiana University School of Dentistry, Indianapolis, Ind., with 5 contributors. Just published. 370 pages, 4⅞"x7⅝", 149 figures. Price, $7.75.

Goldman-Schluger-Cohen-Chaikin-Fox, AN INTRODUCTION TO PERIODONTIA
Provides a Background for Solving Periodontal Problems! Price, $7.75.

Goldman-Burket, TREATMENT PLANNING IN THE PRACTICE OF DENTISTRY
Describes All of the Fundamentals of Treatment Planning! Price, $6.50.

Landy, FULL DENTURES
Presents One Sound, Clinically Tried Technique in Detail! Price, $5.85.

Wuehrmann, RADIATION PROTECTION AND DENTISTRY
Ready in November, 1960. Covers All the Do's and Don'ts in the Use of Dental X-Ray! About $6.25.

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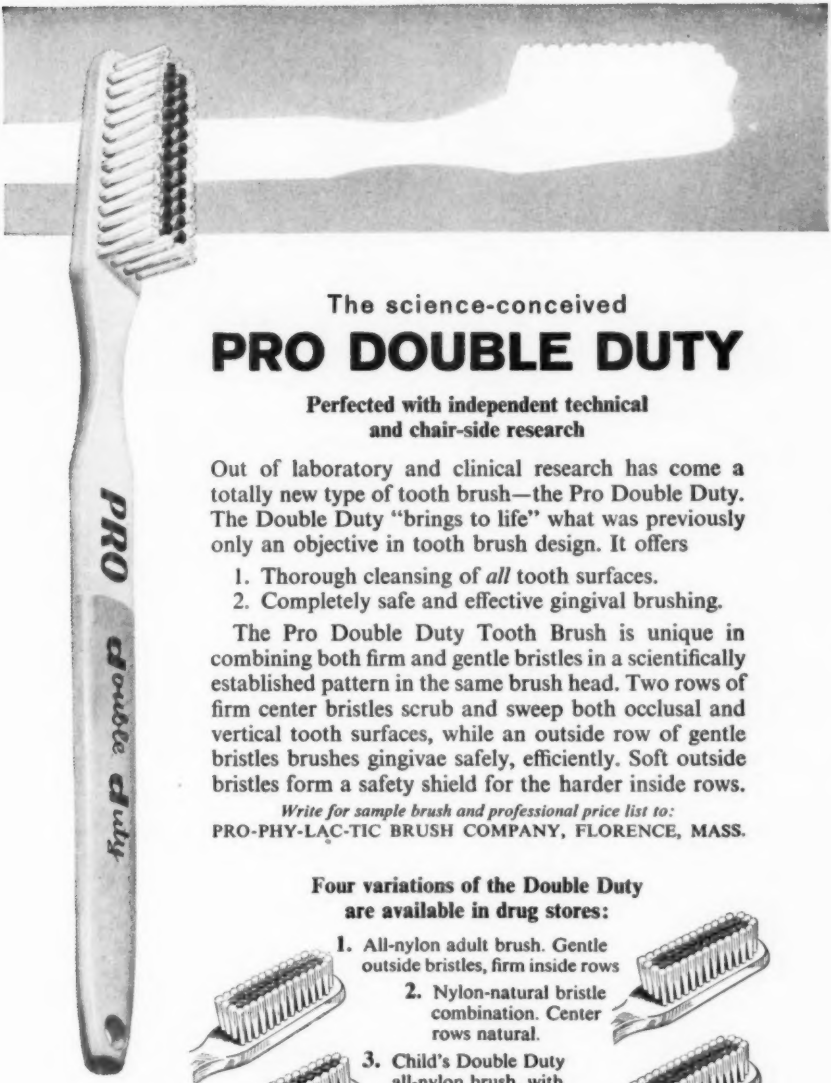

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PRO DOUBLE DUTY

Perfected with independent technical and chair-side research

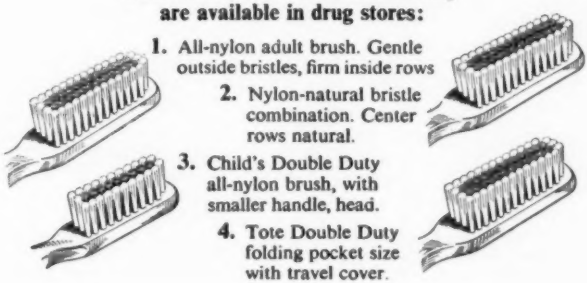
Out of laboratory and clinical research has come a totally new type of tooth brush—the Pro Double Duty. The Double Duty "brings to life" what was previously only an objective in tooth brush design. It offers

1. Thorough cleansing of *all* tooth surfaces.
2. Completely safe and effective gingival brushing.

The Pro Double Duty Tooth Brush is unique in combining both firm and gentle bristles in a scientifically established pattern in the same brush head. Two rows of firm center bristles scrub and sweep both occlusal and vertical tooth surfaces, while an outside row of gentle bristles brushes gingivae safely, efficiently. Soft outside bristles form a safety shield for the harder inside rows.

Write for sample brush and professional price list to:
PRO-PHY-LAC-TIC BRUSH COMPANY, FLORENCE, MASS.

Four variations of the Double Duty are available in drug stores:



1. All-nylon adult brush. Gentle outside bristles, firm inside rows
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3. Child's Double Duty all-nylon brush, with smaller handle, head.
4. Tote Double Duty folding pocket size with travel cover.

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Forms close on 20th of second month preceding month of issue.

Remittance must accompany classified ads. Classified advertising rates are as follows:

30 words or less—per insertion $6.00
Additional words, each 15

Answers sent c/o A.D.A. . . . no extra charge. Replies to A.D.A. box number ads should be addressed as follows:

American Dental Association
222 E. Superior Street
Chicago 11, Ill. Box _____

Box number must appear on the envelope.

PRACTICES AND OFFICES FOR SALE AND/OR RENT

ARIZONA—Tucson pediatrician developing a child-youth center will provide space to specifications for pedodontist and orthodontist. Address A.D.A. Box No. 967.

•

CALIFORNIA—For sale. Active, well established general practice in central California. Effective recall system. Practice on cash basis. Fully equipped, modern office. Pay for equipment only. Retiring. Address A.D.A. Box No. 968.

•

COLORADO—For Sale. Established, active practice. Excellent opportunity for general practitioner. Modern equipment, new building, renewable lease. Beautiful small town near Denver. Ill health reason for selling. Address A.D.A. Box No. 969.

CONNECTICUT—For sale. Well established dental practice in fast growing coastal town. Air conditioned, two-chair office in central location. Pleasant surroundings. Attractive price, generous terms. Leaving state. Address A.D.A. Box No. 970.

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CONNECTICUT—For rent. Two rooms in a new, street level office. Suitable for dental specialty or part time office. Excellent location —center of city. Wonderful opportunity. Share waiting room with podiatrist. Twenty minutes from New Haven, Bridgeport and Waterbury. Address A.D.A. Box No. 971.

•

CONNECTICUT—For sale. Equipped two-chair dental office occupies entire second floor of large house in center of prosperous city of 43,000 population. Other floor suitable for residence or offices. Good investment. Address A.D.A. Box No. 972.

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ILLINOIS—For rent. Deluxe office space. Air conditioned, elevator, complete services. Professional Arts Bldg., 1899 Sheridan Rd., Highland Park, Ill. Contact Harry Earhart on the premises or phone ID 2-0880.

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ILLINOIS—For sale. Established, well equipped, two-chair office. Spacious first floor, air conditioned. Grossing $35,000. High type general practice. Progressive central Illinois county seat of 8,000 population. Terms available. Address A.D.A. Box No. 973.

CARBIDE BURS (Any Make) CAN BE KEPT RAZOR SHARP AT LOW COST

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A trial order, which can be conveniently mailed in an envelope, marked HAND STAMP, will convince every doctor that due to many years of experience in the Bur-Cutting line we are able to recut dull Carbide Burs to be AS GOOD AS NEW.

OUR PRICE FOR LATCH TYPE OR FRICTION CARBIDE BURS, $4.00 per dozen.
Since most burs can be resharpened several times, our service will prove very economical.

U. S. BUR STONING CO. (Est. 1918) 1543 N. Larrabee St. Chicago 10, Ill.

ILLINOIS—For sale. Active, well established, two-chair practice. Former dentist deceased. Seventy miles southwest of Chicago on the Illinois River. Contact Mrs. Ted Clark, Marseilles, Ill., phone BLack 51.

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ILLINOIS—For sale. Six-room dental office fully equipped. Two chairs, two units, x-ray, new high speed Air Drive drill. Small Illinois community; good drawing area from surrounding communities. Address A.D.A. Box No. 974.

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ILLINOIS—For sale. Modern dental office and long established extensive practice. Located in Champaign-Urbana home of the University of Illinois. Will sell reasonable to a man whom I can recommend to my practice. Address A.D.A. Box No. 975.

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INDIANA—Unusual opportunity available. For sale. Ideal dental location next to 3-physician clinic. Small, newly remodeled bungalow office building, two year old Ritter equipment (optional). Practice currently grossing approximately $25,000 per year; low overhead; very low down payment for complete set-up. Address Dr. W. H. Dremstedt, 145 E. Vincennes, Linton, Ind., phone 34.

•

LOUISIANA—Opportunity for young dentist to purchase dental office building with or without equipment. Priced to sell. Small down payment. Owner with F.E.C. in Alaska. Contact Kate Lavigne Real Estate, Ponchatoula, La.

•

MICHIGAN—Kalamazoo. For sale. Five room office attached to seven room brick and frame house in excellent neighborhood. Large corner lot. Parking area. Address A.D.A. Box No. 976.

NEW JERSEY—For sale. Established dental practice. South Jersey. Corner property, masonry construction. Two-chair office, modern, air conditioned. Two apartments, one air conditioned. Over sized detached garage. Excellent community. Moving to Florida. Address A.D.A. Box No. 977.

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NEW YORK—Washington Heig[illegible]. Will turn over fully equipped office and established practice. Seven years old, well kept, reasonable. Address A.D.A. Box No. 978.

•

NEW YORK—Port Washington. For sale. Newly decorated 10 room colonial house, complete dental suite, separate entrance. Three bedrooms, den, two and one half baths, attached garage, large lot, G.I. mortgage, walking distance to station; $35,500. Call POrt Washington 7-8913.

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OHIO—Southwestern. For sale. Fully equipped office, new Ritter equipment, ultra modern. Grossed $19,000 first year. Can have practice free for taking over lease. Owner will keep equipment if necessary. Address A.D.A. Box No. 979.

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OHIO—Cincinnati. Excellent opportunity. For sale very fine combination home and two-chair dental office. Prestige location in fine suburb. Address A.D.A. Box No. 980.

•

PENNSYLVANIA — Philadelphia — For rent. Attractive, corner, modern doctors' block in suburb. Established eight years. Excellent opportunity for active man. Domestic difficulties reason for closing. Two blocks from shopping center. Excellent transportation and parking. Thickly populated. Reasonable rental. Address A.D.A. No. 981.

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1 milligram of fluorine

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Complete information, J.A.D.A. reprints, samples, dispensing labels, prices, and prescription instructions, furnished free upon request. Write to:

Fluoritab Corporation, 625 South Saginaw Street, Flint 2, Michigan

THE DAILY LOG
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☐ Please send me more information plus FREE Record Supplies Catalog Kit.

Dr._____

Address_____

City_____ State_____

WASHINGTON—For sale. Well established practice in eastern Washington college town. Dentist retiring. Immediate occupancy. Completely equipped two-chair office. High speed handpieces, porcelain and inlay furnaces, x-ray. Contact Dr. A. E. Hudson, Box 383, Pullman, Wash.

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WISCONSIN—For sale. Active practice in a progressive small community in the center of a fine dairy farming area. Best hunting, fishing and boating in state. Can rent new, three bedroom home. Offices are in one entire wing of a beautiful, new medical center. Completely furnished with latest dental office equipment, supplies, record system, etc., including air conditioning, hi-fi, wall to wall carpeting, private paved parking lot. Trained assistants available. Present dentist leaving for specialty training. No cash needed. No other dentist in community. Contact Dentist, Boyd Medical Center, Boyd, Wis.

OPPORTUNITIES AVAILABLE

CALIFORNIA — Wanted. Orthodontist for group practice in southern California. Must have California Boards and formal edgewise technic training. Starting salary $18,000 per annum. Address A.D.A. Box No. 922.

•

CALIFORNIA — Wanted. Qualified general practitioner for group practice in southern California. Address A.D.A. Box No. 777.

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FLORIDA—Position open for association or will sell half interest in large, active, three-chair, modern, air conditioned office. Military obligation completed. Address A.D.A. Box No. 924.

FLORIDA KEYS—Islamorada. We have an exceptional opportunity for a personable, all around dentist. Established medical building. Contact Dr. Harvey W. Cohn, Venetian Shores Medical Bldg., Tavernier, Fla.

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MASSACHUSETTS—Associate wanted. General dentistry, excellent opportunity, ideal working conditions. Give full particulars concerning age, schools attended, military status, special training and experience. Address A.D.A. Box No. 982.

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MINNESOTA—Associate wanted for busy practice with possibility of eventual partnership. New, modern, air conditioned office, 15 miles from Twin Cities. Address A.D.A. Box No. 983.

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Orthodontist wanted to associate or purchase exclusive practice in New York City. Mainly labial-lingual and twin wire technics used. Please send complete information to A.D.A. Box No. 941.

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OHIO—Wanted. Personable dentist with Ohio license, military obligation completed, to associate with dentist in busy three-chair office. Cincinnati area. Address A.D.A. Box No. 984.

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WASHINGTON—Foreign missionary work. Excellent opportunity for qualified men in all parts of the world. For details apply to The Missionary Dentist, Seattle 33, Wash.

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WEST VIRGINIA—A.D.A. approval pending. Oral surgery internship. Stipend $2,700-$3,600 per annum. United States citizenship required. Address Administrator, Cabell Huntington Hospital, Huntington, W. Va.

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Opening in excellent, rapidly growing area for dentist with Virginia state license. Furnish details in writing to P. O. Box 68 (Denbigh Station), Newport News, Va.

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Gives the most homogeneous mix, thus permits smooth wax-like carving. Develops high initial and permanent strength. Assures permanently sealed cavities. Fillings retain mirror-like lustre indefinitely. Ultra-Brand Alloys appear on the A.D.A. list of Certified Dental Materials.

Use ULTRA-BRAND NON ZINC Micro-Grained ALLOY or PELLETS when cavities must be filled under the adverse conditions of incomplete dryness.

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General practitioner recently licensed in California, age 33, nine years' experience, married, family, veteran, desires association in southern California. Address A.D.A. Box No. 986.

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Oral surgeon, age 29, completing third year approved training including all types of anesthesia, desires association (July 1, 1961) with oral surgeon, group practice or opportunity to locate. Military obligation completed. Connecticut, New York and National Boards. Will take necessary Boards. Address A.D.A. Box No. 987.

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OPPORTUNITIES WANTED

CALIFORNIA—1958 Minnesota graduate, military obligation completed, two years' experience in prosthetics and clinic administration, excellent references. Desires association in active, high class practice. Willing to make very substantial monetary investment. Address A.D.A. Box No. 985.

Successful practitioner, 12 years' experience, desires Florida association in high caliber dental office. Personable, capable, top grade operator. Varied postgraduate training. Excellent office manager. Will invest, take over for your vacation, references. Address A.D.A. Box No. 988.

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ILLINOIS—Dentist completing military obligation November 1960. Illinois licensed, age 28, 1958 University of Illinois graduate. Will consider association, purchase, new location or straight salary. Address A.D.A. Box No. 956.

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Oral surgeon, 20 years' experience, desires association, full or part time with established oral surgeon leading to partnership or purchase. New York City, Westchester or New Jersey preferred. Licensed in New York and New Jersey. General anesthesia experience. Available immediately. Address A.D.A. Box No. 989.

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Dentist desires full or part time association leading to partnership in high quality dental practice in New York City or New Jersey. Many years' experience in all phases of dentistry and surgery. Address A.D.A. Box No. 990.

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Dentist licensed in Ohio and Pennsylvania would like to associate with or work for prosthodontist. Address A.D.A. Box No. 991.

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Oral surgeon, 29, veteran, four years' approved training, three years' general anesthesia experience. Desires location or association in oral surgery practice. Licensed in New York, Pennsylvania and Connecticut. Address A.D.A. Box No. 960.

Dentist, general practitioner, age 44, licensed in New York, 1940 graduate. Desires permanent position with privately owned or government hospital (general), institution or health service. Address A.D.A. Box No. 992.

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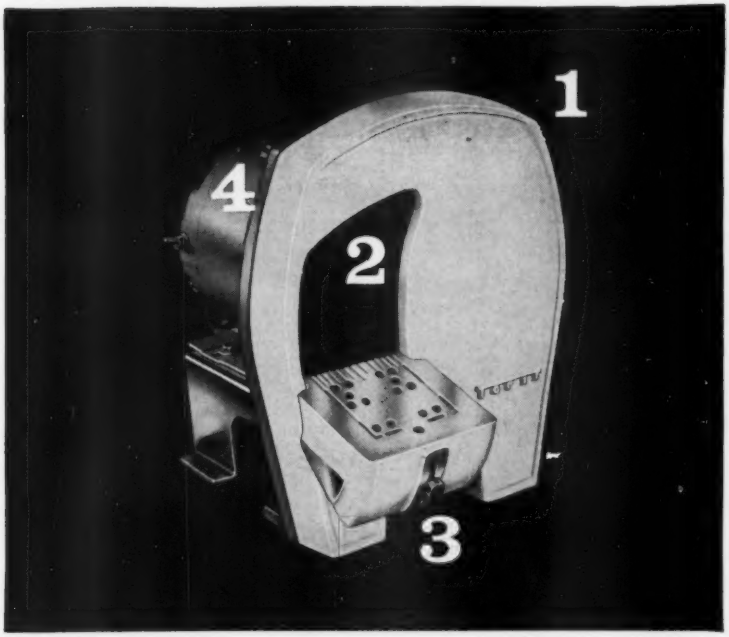
TEXAS—For sale. Ritter rest and relief stool in good condition, $50; Gomco aspirator, excellent shape, $50; Amal-pac handpiece and points, $20; Wig-L-Bug amalgamator, black, $50; Kodak Startech Camera for close up and intraoral pictures, $30. Address A.D.A. Box No. 966.



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Here's a new, more efficient, more compact TORIT Model Trimmer! Note these improvements:

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Broken denture repairs
Untrained and unskilled

hazards behind this front?

are a serious problem.
hands can do great damage.

THE AMERICAN DENTAL ASSOCIATION says:

1. Protect your patient by telling him about the skill necessary to make and maintain his dentures. Tell the patient why he should come to you for repairs and refitting.

2. The A.D.A. has established specifications for denture base materials. *Know* the products you use . . . make sure they meet the A.D.A. specifications.

3. *Know* your ethical dental laboratories. Their reputation assures you of quality materials and workmanship.

Presented as a service to the profession by Luxene, Inc., New York City

What's she doing that's of interest to her dentist?

She's drinking a glass of pure Florida orange juice. And that's important to her dentist for several reasons.

Your patient's oral health is directly related to the quality of her diet, and a good diet includes a generous amount of vitamin C and any of the other nutrients found in citrus fruits.

There's actually no better-tasting way for this young lady to obtain her vitamin C than by doing just what she is doing, for there's no more refreshing source than oranges and grapefruit ripened in the luxurious Florida sunshine. An obvious truth, you might say, but not so obvious to the parents of many teen-agers.

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That's why the young lady's activities are of interest to her dentist.

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BEAUTIFUL APPEARANCE

The final Micro-Bond restoration is a complement to her youth, also an achievement in oral health and appearance.

The need to restore this mouth to good health and appearance is evidenced in this "before" close-up of her smile and her radiographs.

Micro-Bond is ideally suited for a young patient who must look ahead to years of service and pleasing appearance. For this young patient Micro-Bond was truly a necessity. Her anterior teeth were a mass of silicate patches with a non-vital right central supporting a temporary crown. With extraction of that root and preparations of the remaining teeth, a six-tooth Micro-Bond restoration was provided that enhanced her appearance and will provide for years of service.

This patient is featured in a new motion picture film on Micro-Bond, "Designed for Beauty". For information, call or write your local Vitallium laboratory, or Library Service, Scientific Film Company, 909 East 31st Street, La Grange Park, Illinois.

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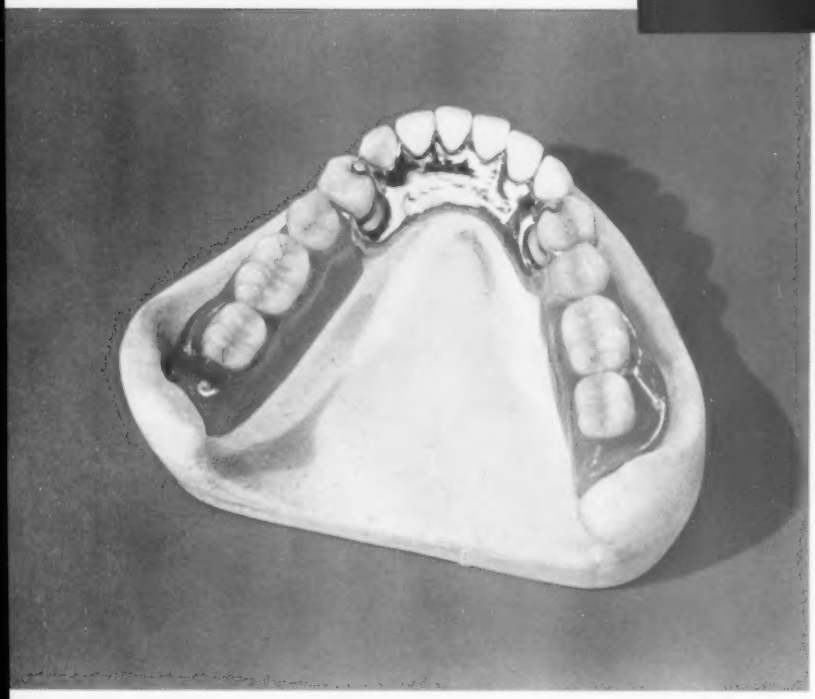

Abutment crowns in Micro-Bond with an all-over coverage of porcelain together with a Vitallium removable partial denture is prosthetic dentistry at its best. Specially prepared milled rest seats provide the retention and the stability. Concealed D-E Hinges® relieve the stress on the abutments.

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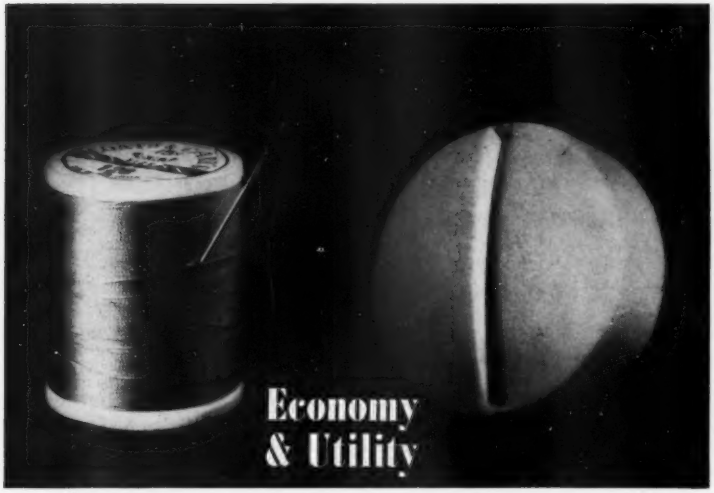

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101st Annual Session, American Dental Association

October 17-20, 1960 – Los Angeles

- Reservation requests for housing accommodations should be made by completing this application and mailing it to A.D.A. Housing Bureau, P.O. Box 5440, Chicago 7.
- *Make your reservation now!* Assignments will be made in order received.
- Scientific session and exhibits will be held in the new Sports Arena. Meetings of the House of Delegates will be in the Statler Hilton Hotel.
- Indicate the date you will arrive in Los Angeles and check the form of transportation you will use as well as the departure time.
- Reservations will be held only until 6 p.m. of the day of arrival unless specific arrangements are made with the hotel or motel.
- If rooms listed are not available, an assignment will be made, whenever possible, to a hotel or motel in the same area.

American Dental Association Housing Bureau, P.O. Box 5440, Chicago 7

PLEASE PRINT OR TYPE

Name of applicant_____

STREET ADDRESS _____ CITY _____ ZONE _____ STATE _____

Date Arriving_____ via ☐ Auto ☐ Plane ☐ Train Date Leaving_____

accommodations

Hotel_____ FIRST CHOICE

Hotel_____ SECOND CHOICE

Hotel_____ THIRD CHOICE

Hotel_____ FOURTH CHOICE

Motel_____ FIRST CHOICE

Motel_____ SECOND CHOICE

☐ Single occupancy, rate to range from $_____ to $_____ per day.

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☐ Suite of_____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Rooms will be occupied by:

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NAME _____ ADDRESS _____ CITY _____ STATE _____

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Alexandria	$ 7.00 - 8.00	$ 9.00 - 11.00
Biltmore	8.00 - 11.00	11.00 - 16.00
Clark	5.50 - 6.50	8.00 - 14.00
Figueroa	8.00	8.50 - 14.00
Gates	4.00	5.00 - 7.00
Hayward	7.00	9.00 - 11.00
Lankershim	5.00 - 6.50	6.50 - 8.50
Ritz Flower	—	4.00 - 7.50
Rosslyn	4.00 - 6.00	5.00 - 8.50
San Carlos	3.75 - 6.00	3.75 - 7.00
Savoy Plaza	6.00 - 7.50	7.00 - 8.50
*Statler Hilton	9.00 - 15.50	12.50 - 18.00

*Headquarters hotel – special application form required.

MOTELS		
Parkway Motel	7.00	8.00
Royal Viking Motel	7.50 up	8.50 up

Wilshire District – 15 Minutes to Sports Arena

HOTELS		
Chapman Park	—	14.00
Gaylord	8.50	11.50
Mayan	5.00	7.00 - 9.00
Normandie Wilshire	—	8.00 - 10.00

MOTELS		
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HOTELS		
Hollywood Inn	—	9.00 - 10.00
Hollywood Knickerbocker	9.00 - 12.00	12.00 - 15.00
Hollywood Plaza	8.00	11.50
Hollywood Roosevelt	—	12.00 - 18.00

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now with complete extra handpiece

the new, trouble-free, high-speed (20,000 to 350,000 RPM)

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CONTROLLER allows positive foot control of speed and water spray — no complex electrical circuits to go out of order. Separate pedals operate air and water together, or air only if desired. Simplest possible maintenance, easy installation.

HANDPIECE is comfortable to hold, supplies ample torque, has no maintenance problems. Noise level is 70-75 decibels. Dual jet water spray. Standard friction grip chuck. Handpiece hanger bracket supplied with unit.

only $345.00 with two handpieces

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COMPACT. Nothing to clutter the unit or bracket table arm — the controller is on the floor, takes up less space than this page.

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GUARANTEED. Controller is guaranteed against mechanical defects for 1 year, handpiece for 6 months.

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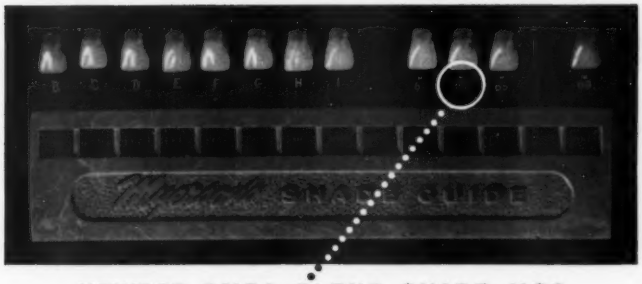
New Dura-Blend Shades
Improve Matching Accuracy

With its four new shades, recent tests show that Myerson's Dura-Blend plastic shade guide will now provide the shade match of choice 52% more often than any of the others in general use.

This means that no matter what other shade guides you have been using, much more satisfactory results in shade matching will now be obtained with the new Dura-Blend shade guide.



NEWEST DURA-BLEND SHADE, M66

You can easily prove to yourself that these findings are valid and important to your practice. If you don't have the latest Dura-Blend shade guide (shown above), write to:

Myerson Tooth Corporation
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ORDER NOW... to insure prompt delivery. Supply is limited.

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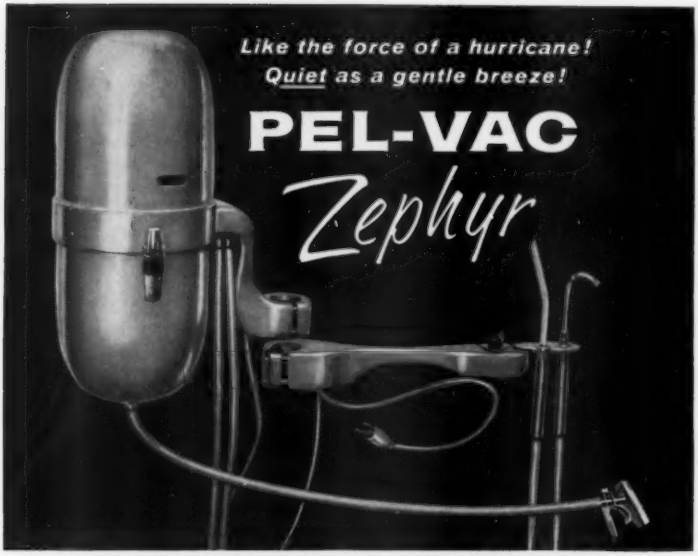

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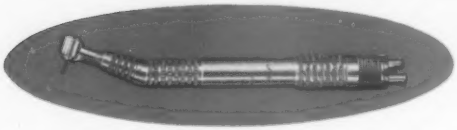
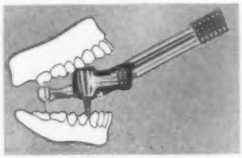


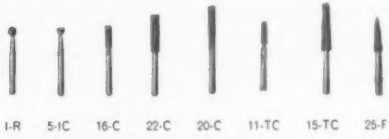
MIDWEST'S MINIATURE HEAD AIR-DRIVE CONTRA ANGLE

Increase the efficiency of your air driven equipment by adding the Midwest MINIATURE AIR-DRIVE CONTRA ANGLE. Advantageous for both child and adult patient. It's 7 M/M shorter head enables you to do work which could not be done before. Operates in the same speed range as larger air driven contra angles with a considerable reduction in the sound level.

Important for precision cavity preparation. Provides increased working area—greater visibility—better control, easier access to posterior regions.



PROVIDES EASIER ACCESS TO POSTERIOR REGIONS



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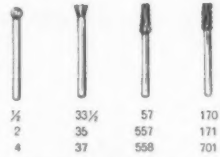
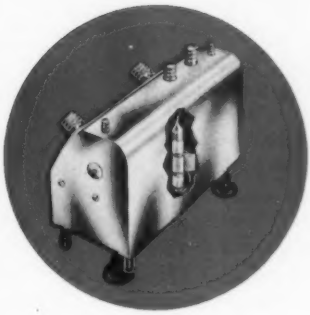


MINIATURE DIAMONDS IN 8 SHAPES

Increases efficiency and guarantees a perfect relationship between the angle and the diamond. The overall shortness in the Miniature Head lets you make preparations not easily done with larger head contra angles.

MINIATURE CARBIDE BURS

Made for the Midwest Miniature Contra Angle only...guaranteed to have perfect relationship between the bur and the contra angle...for even greater precision.



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An important innovation for air turbine contra angles is the warming of water for the water spray. This feature adds greatly to patient comfort by reducing thermal shock and adds to the efficiency of the unit.

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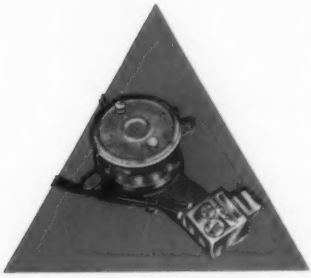

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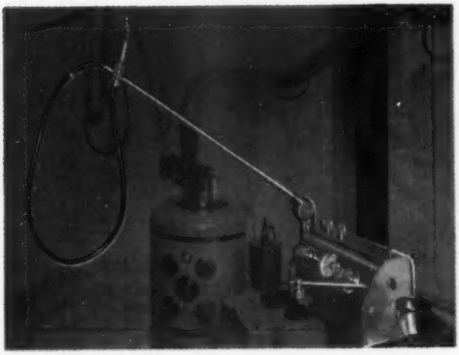
Adjusts speed from High to Low and back again. Toe pressure changes bur speeds, provides slower speeds required for fine finishing operations, decay removal, and cutting of dentin. No stops, No delay! At top speed you can reduce speed without going back to stop position by reducing toe pressure. You stand in a balanced position—reduces fatigue. Features a built-in water separator.



MIDWEST'S CONTRA ANGLE SUPPORT ARM

Has all the flexibility of the regular handpiece engine arm plus that provided by the elimination of belts and pulleys. Places air drive contra angle conveniently within reach when operating—can be easily pushed aside when not needed.

Midwest Dental Mfg. Company

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THE SWEET TOOTH

"Low sugar diets are commonly used for caries control".[1] But maintaining a low sugar diet has always been difficult, especially for children with a thirst for soft drinks.

Fizzies are a great help. These satisfyingly sweet soft drink tablets contain no sugar whatsoever. Sweetening comes from Sucaryl® and Saccharin.

You just drop a Fizzies tablet in a glass of cold water for an instant, sparkling drink. Seven delicious flavors: Cola, Root Beer, Grape, Cherry, Orange, Lemon-Lime and Hula Punch (a mixed fruit flavor).

Recommend Fizzies to caries-prone patients. A product of Warner-Lambert Products Division.

[1]"Oral Hygiene" by Russell W. Bunting Lea & Febiger 1957 p. 150

FIZZIES...THE TABLET THAT MAKES AN INSTANT, SPARKLING DRINK

Flexible and Strong!

Buffalo Dental SPATULAS

Buffalo Dental Stainless Steel Spatulas have the desired combination of strength and flexibility. They are available in a wide variety of blade sizes.

"R" Group Blades are of finest quality stainless steel and are fastened securely with 2 heavy brass rivets into polished rosewood handles.

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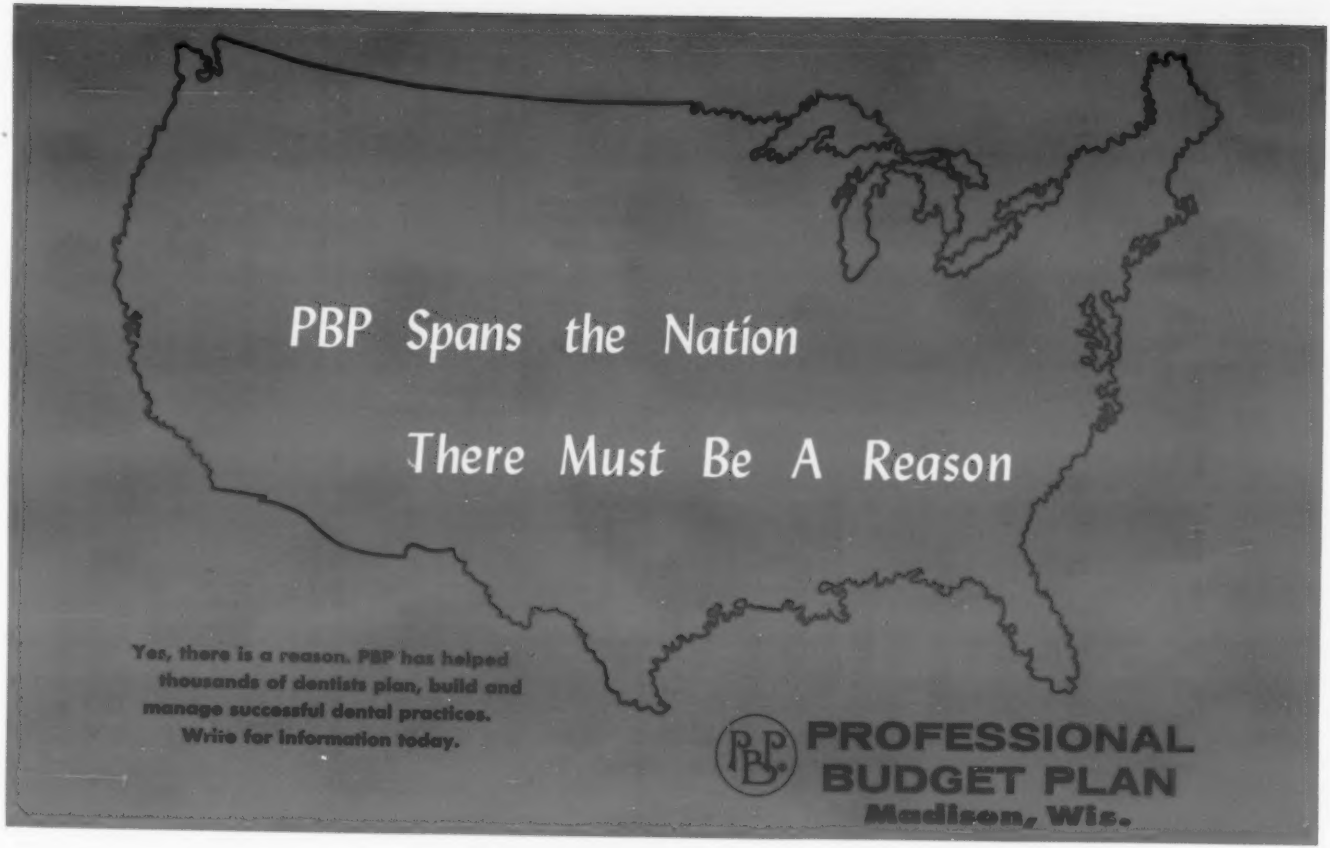
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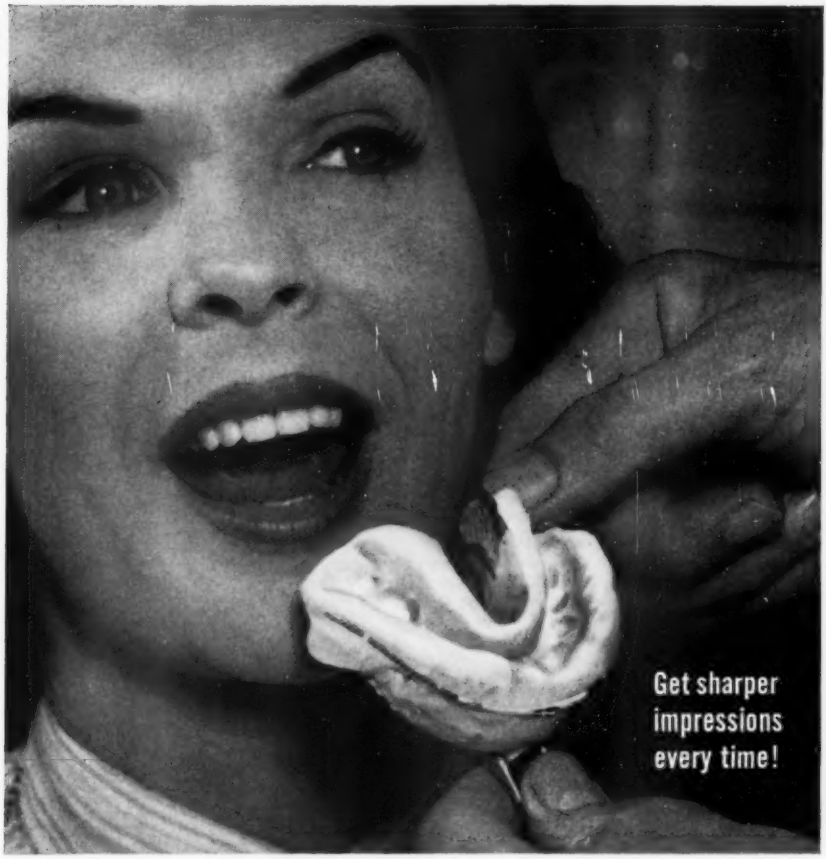

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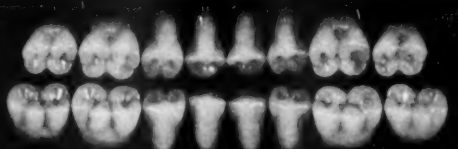

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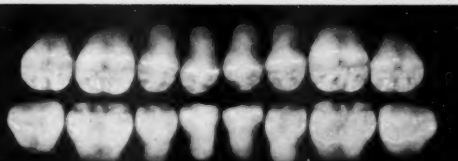

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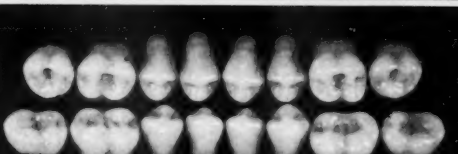

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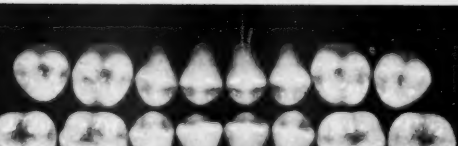

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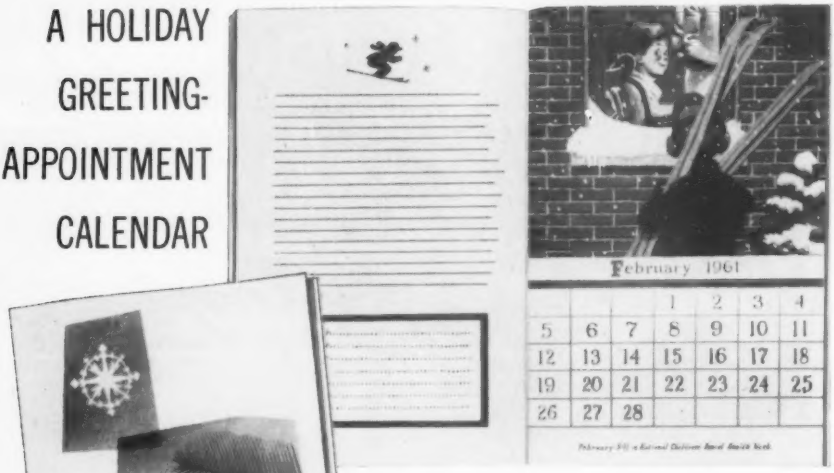

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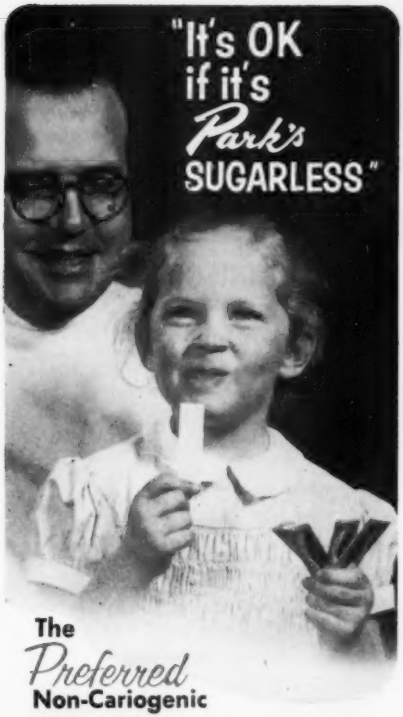

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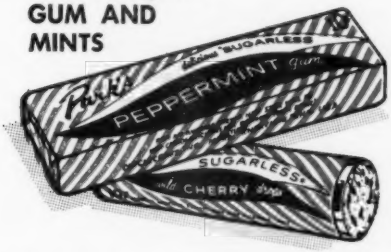

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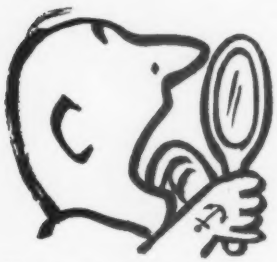

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1. Cobe, H. M., Oral Surg., Oral Med., Oral Path., Vol. 13, No. 6, (June, 1960), pp. 678-685.
2. Harkins, H. P., The Eye, Ear, Nose & Throat Monthly, Vol. 38, (Nov., 1959), pp. 942-944.
3. Cobe, H. M., Cohen, D. Walter, Hattler, A. B., Pa. Dent. Jrl., Vol. 24, (Jan., 1959), pp. 12-18.

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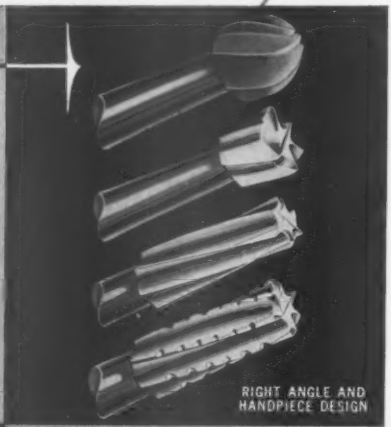

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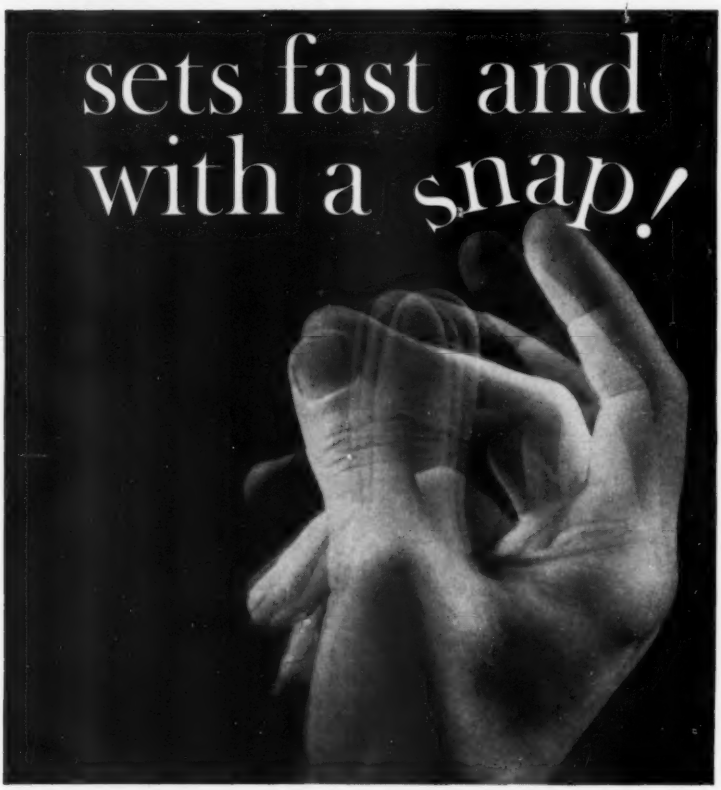

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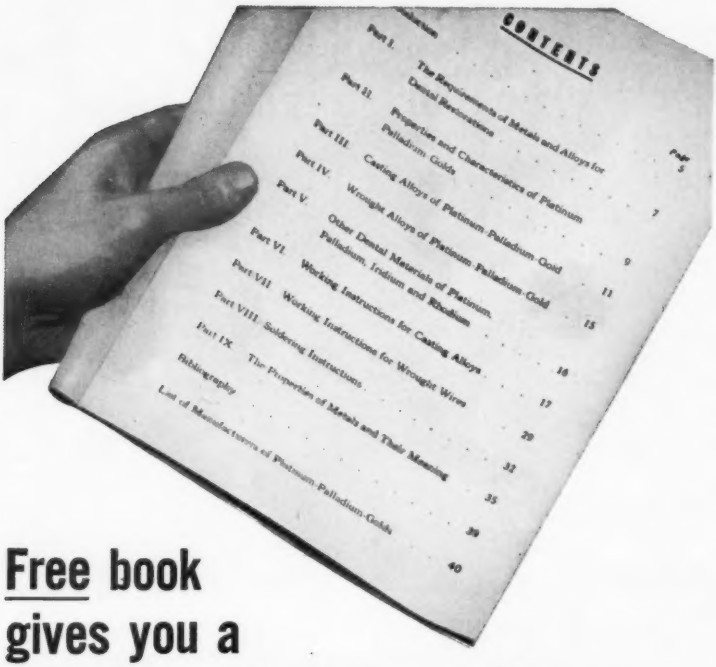
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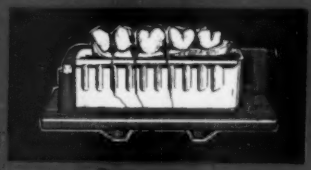

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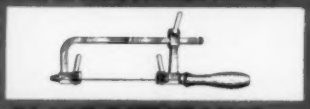

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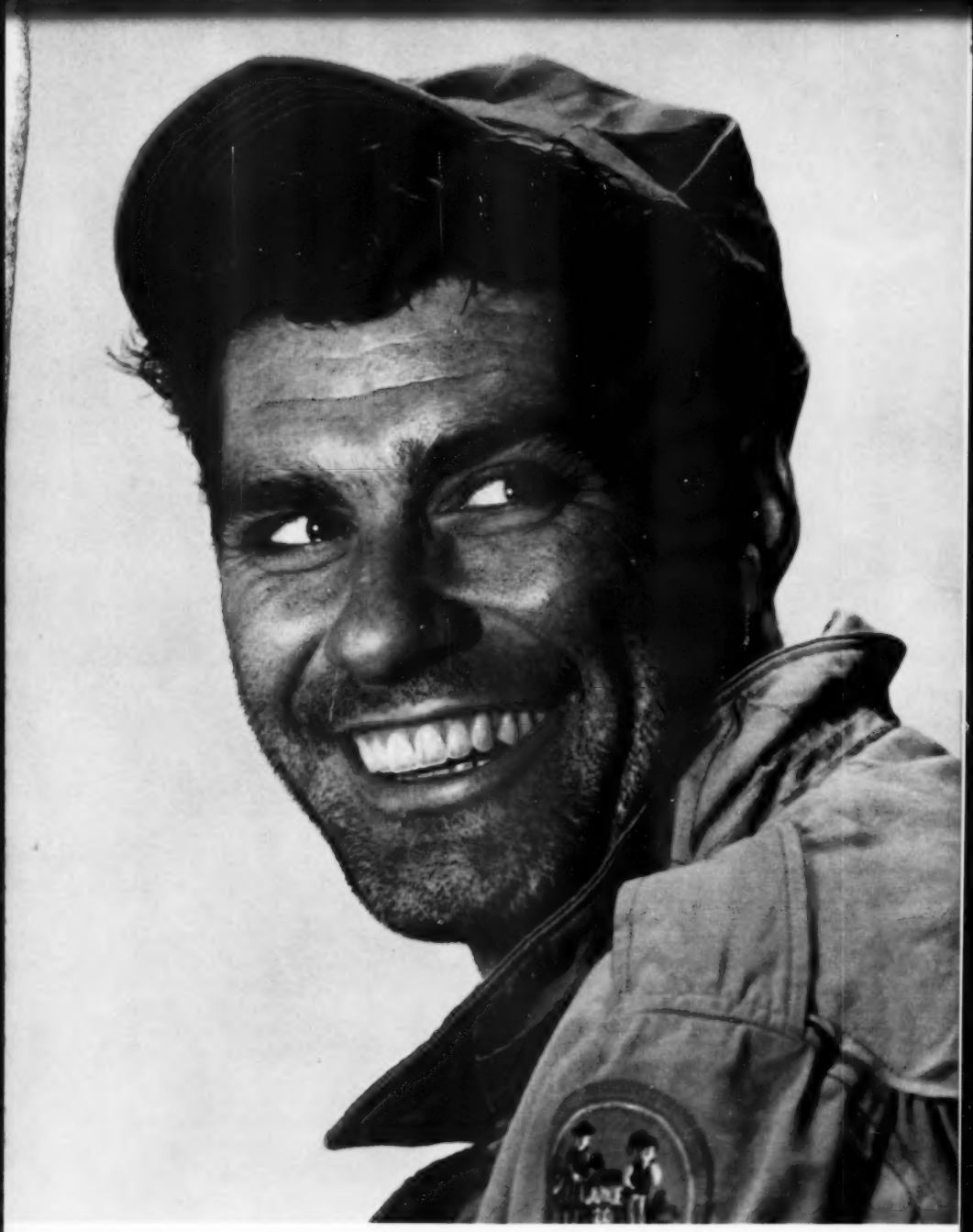

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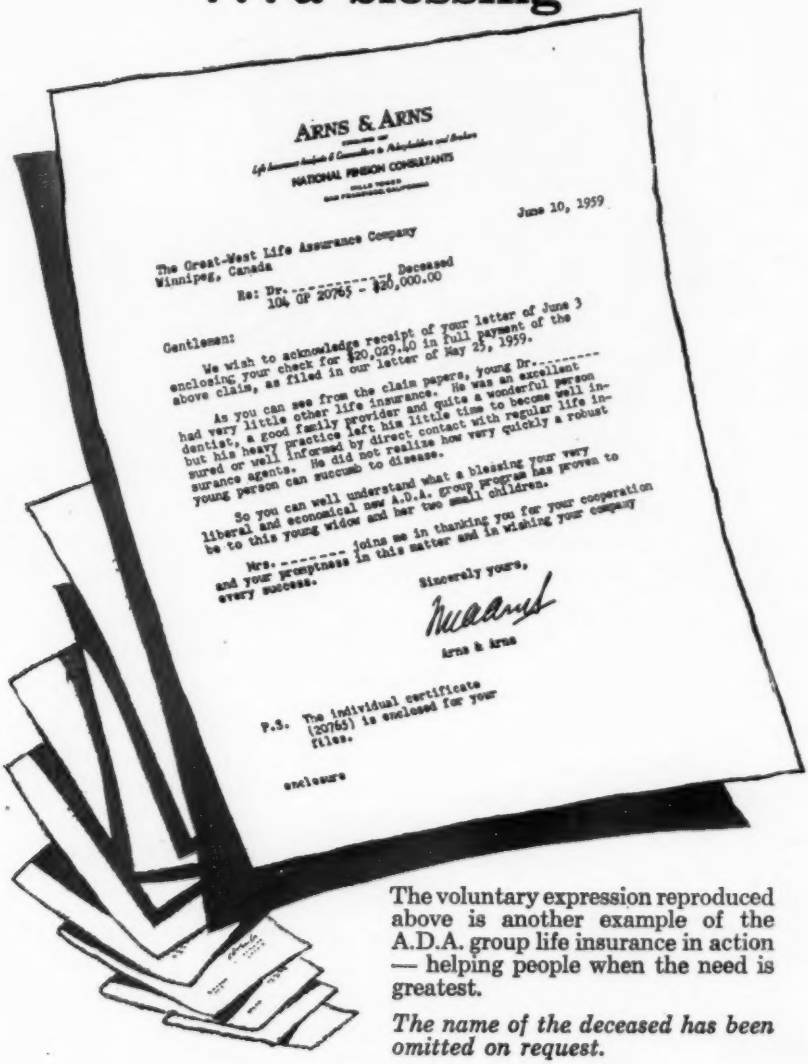

ARNS & ARNS

NATIONAL PENSION CONSULTANTS

June 10, 1959

The Great-West Life Assurance Company
Winnipeg, Canada

Re: Dr. _____ Deceased
104 GP 20765 - $20,000.00

Gentlemen:

We wish to acknowledge receipt of your letter of June 3 enclosing your check for $20,029.40 in full payment of the above claim, as filed in our letter of May 25, 1959.

As you can see from the claim papers, young Dr. _____ had very little other life insurance. He was an excellent dentist, a good family provider and quite a wonderful person but his heavy practice left him little time to become well insured or well informed by direct contact with regular life insurance agents. He did not realize how very quickly a robust young person can succumb to disease.

So you can well understand what a blessing your very liberal and economical new A.D.A. group program has proven to be to this young widow and her two small children.

Mrs. _____ joins me in thanking you for your cooperation and your promptness in this matter and in wishing your company every success.

Sincerely yours,

Arns & Arns

P.S. The individual certificate (20765) is enclosed for your files.

enclosure

The voluntary expression reproduced above is another example of the A.D.A. group life insurance in action — helping people when the need is greatest.

The name of the deceased has been omitted on request.

UNDERWRITERS OF THE A.D.A.
GROUP LIFE PROGRAM

THE GREAT-WEST LIFE ASSURANCE COMPANY
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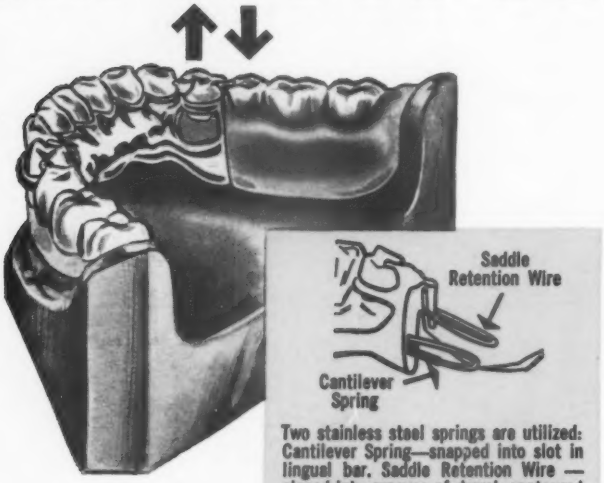

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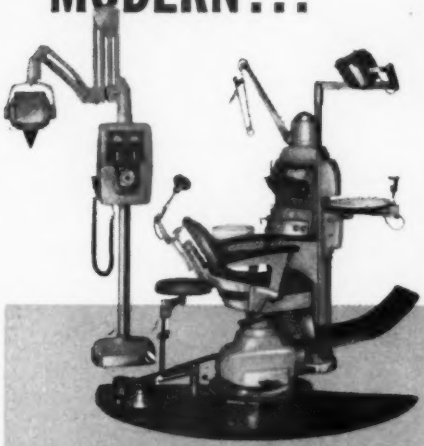

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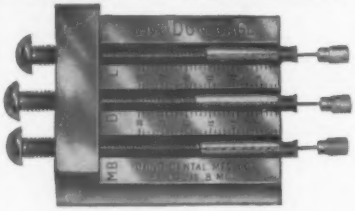

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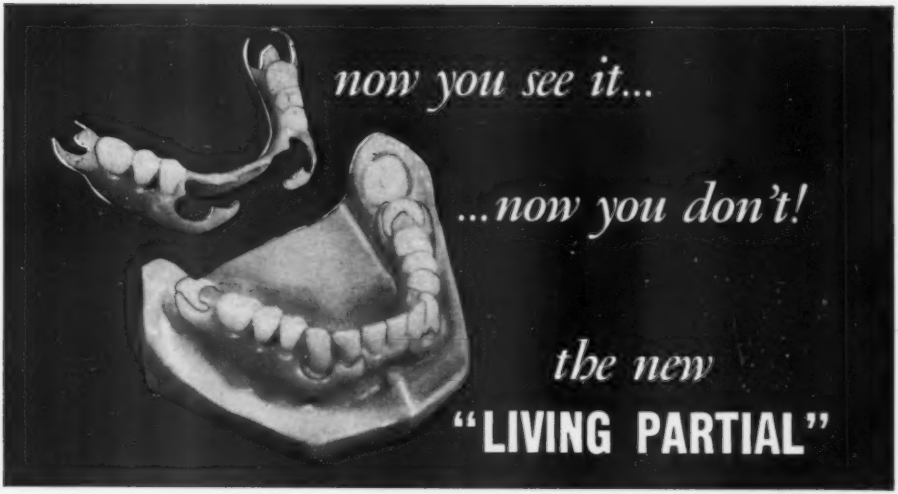

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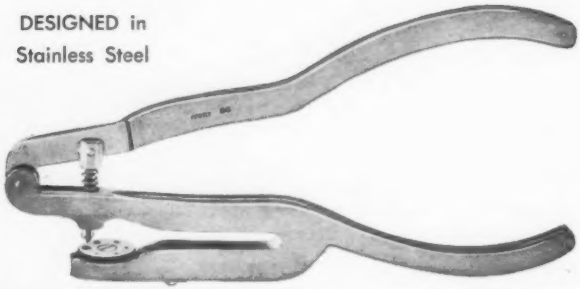

Only a clean cut hole in rubber stands extensive stretching. Ragged edges tear easily. This design permits the punch to move up and down in a straight line, thus insuring a perfectly cut hole in the dam. A moderately large hole will exclude moisture better than one too small. The six different size holes in the disk meet your every requirement. A real feature is the fact the disk may be resharpened or replaced.

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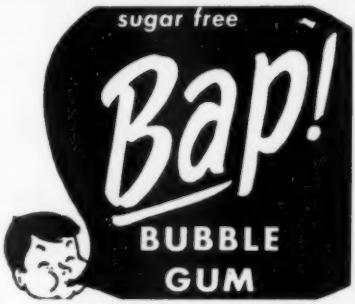

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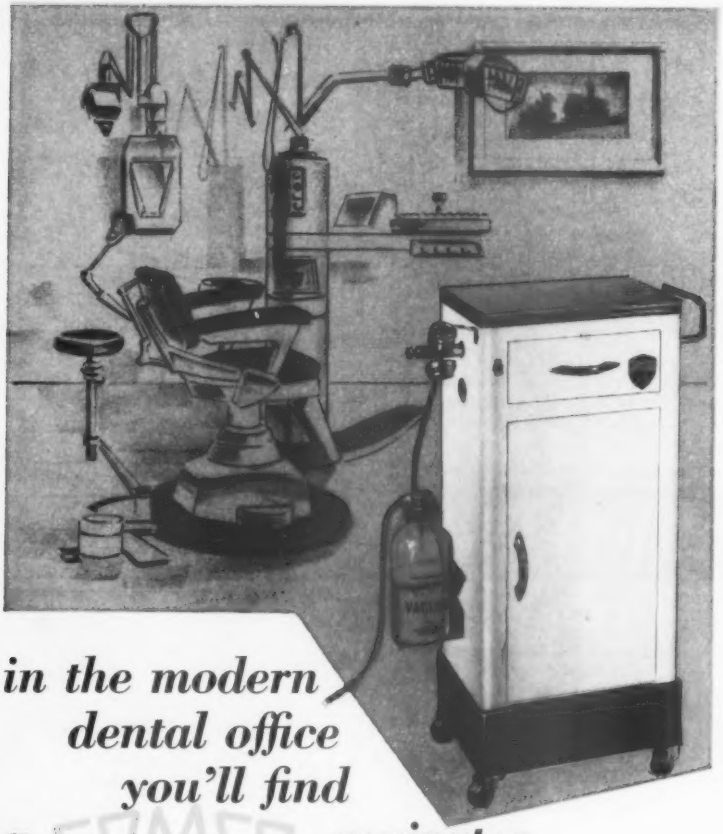

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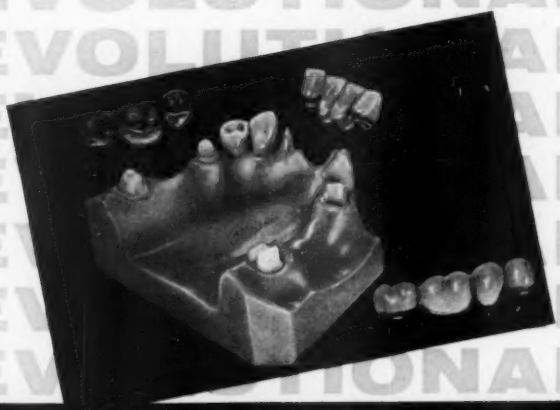

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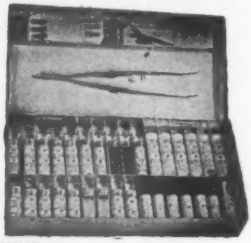

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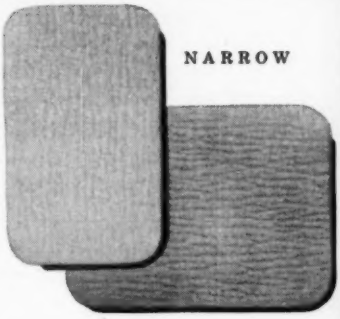

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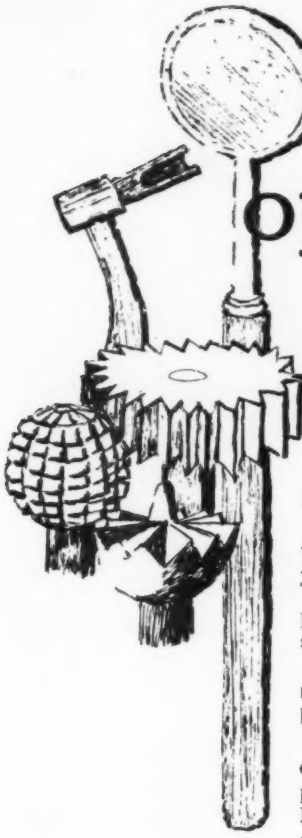

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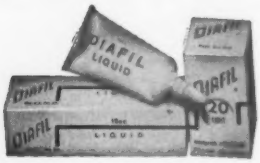

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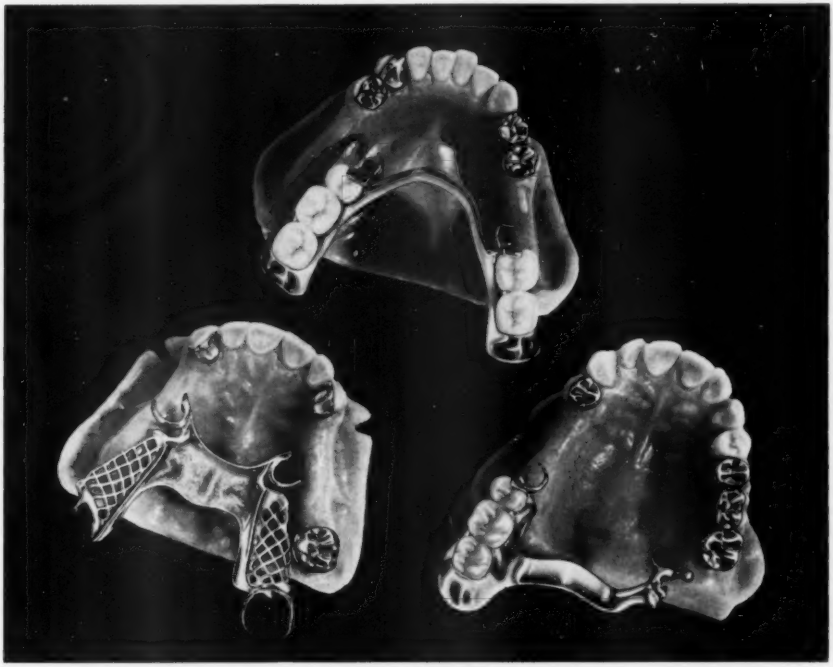

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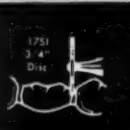

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